ROW-PETERSON ARITHMETIC 5

Row - Peterson Arithmetic

BOOK FIVE

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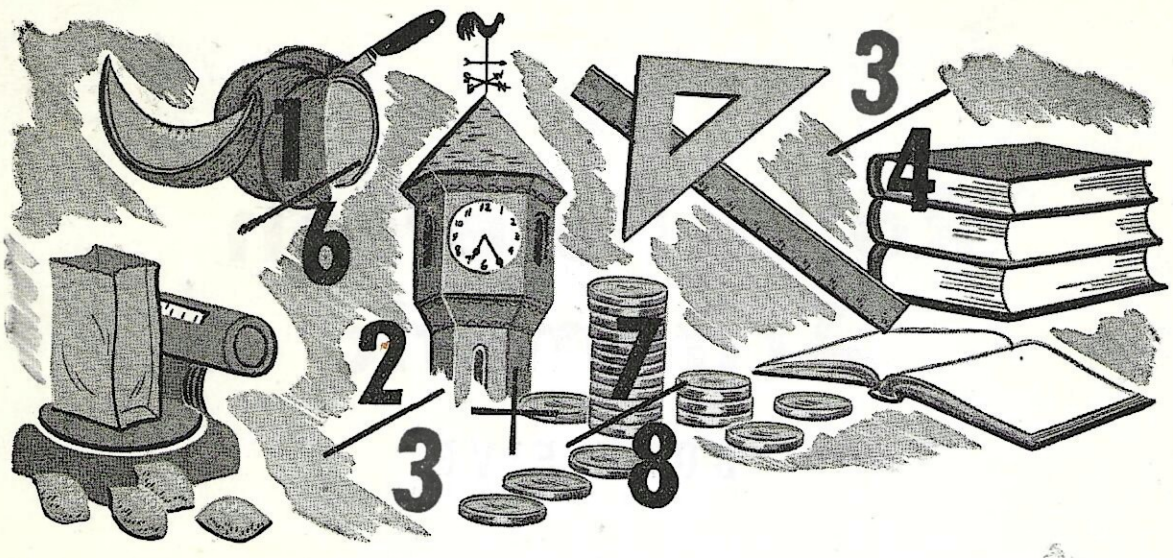

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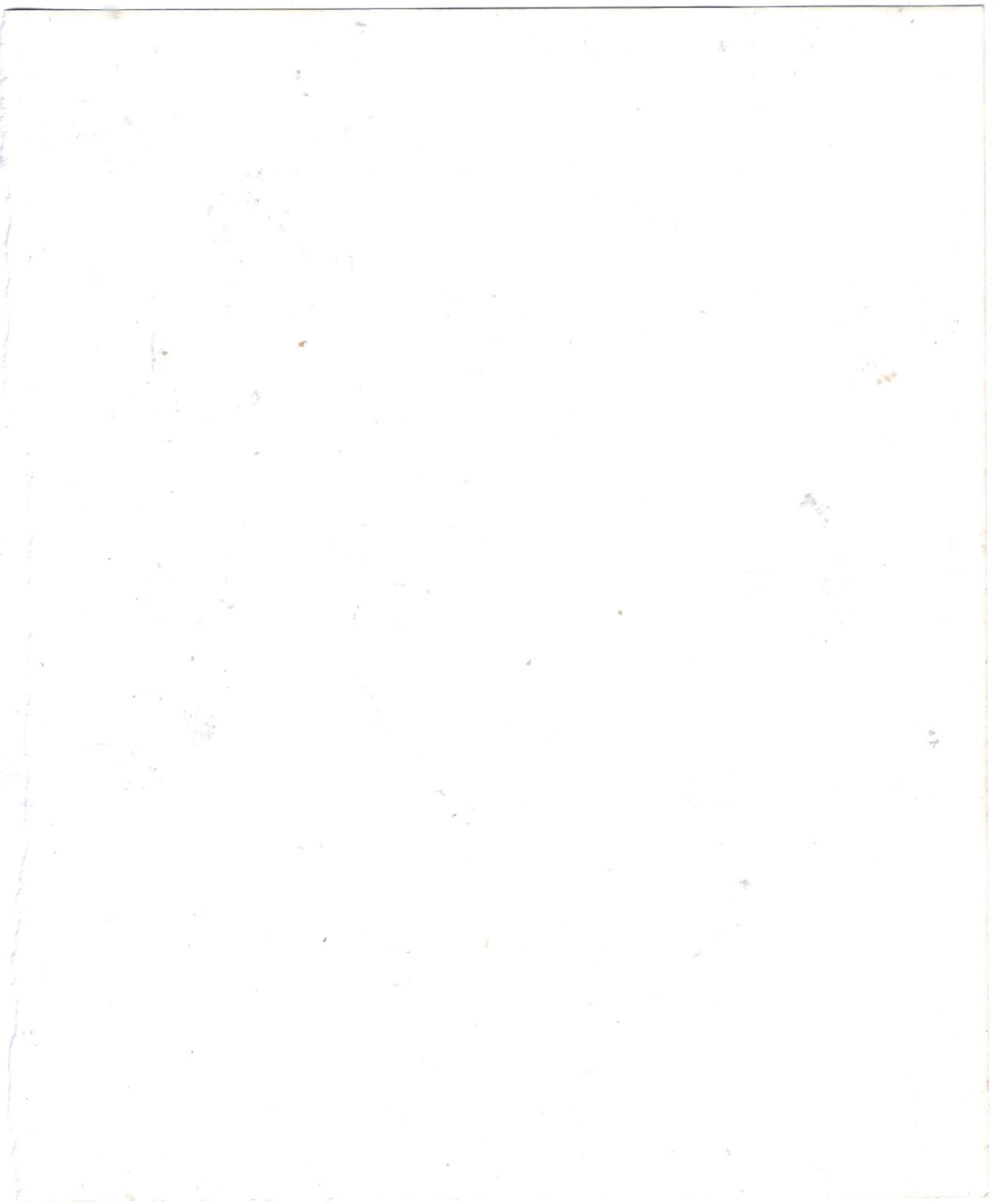
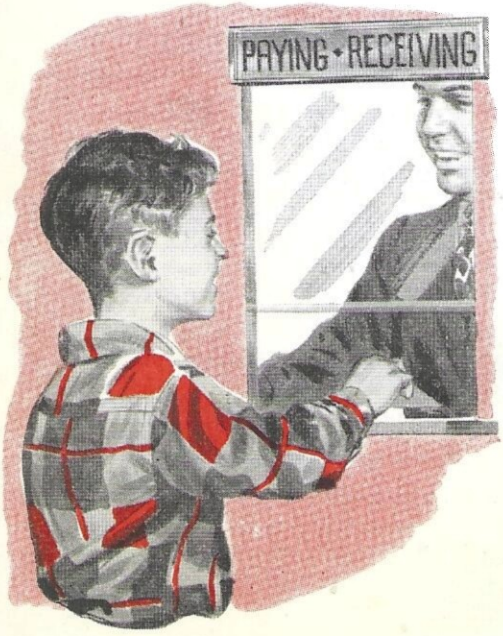


Chapter 1
Adding and Subtracting



Using Arithmetic

The pupils in the fifth grade at Riverside School were telling about the uses they made of arithmetic during the summer vacation.

"I had to use arithmetic every day while I was away at camp," said Alice. "Mother sent me $8.00 each week, and I had to pay $6.50 as my share of the camp expenses."

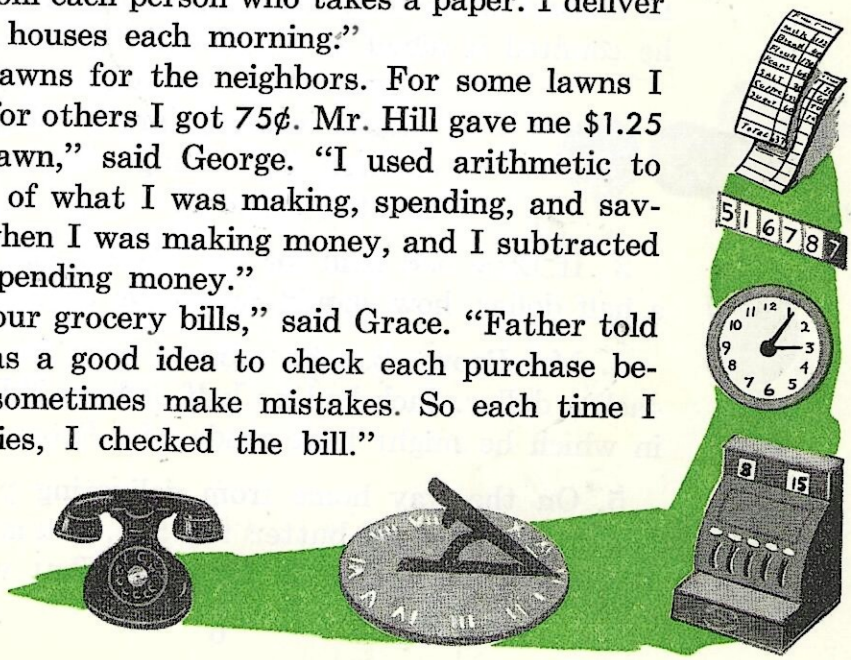
"Well!" said Henry. "The manager of the camp gave you a dollar and fifty cents change, and you had that left. Not much arithmetic there."

"Yes, but there was," answered Alice. "I had to buy stamps, paper, envelopes, and post cards, and then I bought candy and ice cream—all with my $1.50. I had to subtract and multiply and count change."

Robert spoke up, "I use arithmetic all the time. I have a paper route. My papers cost 12¢ a week, and I collect 20¢ a week from each person who takes a paper. I deliver papers to 45 houses each morning."

"I mowed lawns for the neighbors. For some lawns I got 50¢, and for others I got 75¢. Mr. Hill gave me $1.25 to mow his lawn," said George. "I used arithmetic to keep a record of what I was making, spending, and saving. I added when I was making money, and I subtracted when I was spending money."

"I checked our grocery bills," said Grace. "Father told me that it was a good idea to check each purchase because people sometimes make mistakes. So each time I bought groceries, I checked the bill."



Using Arithmetic

"I guess I had to use arithmetic more than anyone else," said Jack Woods. "I worked as a clerk in the grocery store. Elsie was one of my best customers."

Working in the store gave Jack a lot of practice in arithmetic. Here are a few of his problems:

1. One day Elsie bought a bag of sugar for 35 cents and a box of oatmeal for 29 cents. How much should Elsie pay for the groceries? How much should Jack charge her for the groceries?

2. Another day Elsie bought a loaf of bread for 16¢. She gave Jack a quarter. How much change should he give Elsie?

Jack did not subtract to find how many cents he should give Elsie. He just counted the change. He counted it to himself as he took the money from the cash box, and he counted it aloud as he gave it to Elsie.

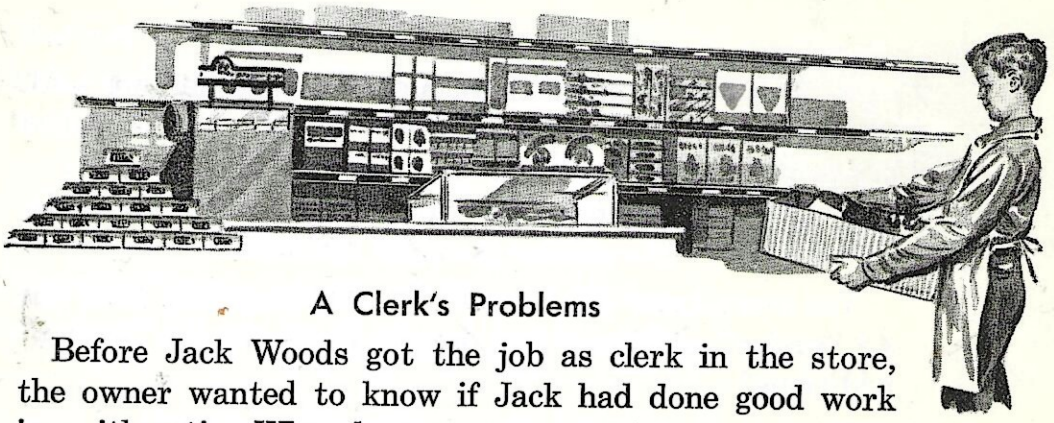
Count Elsie's change as Jack did.

Elsie was a careful shopper; so she counted the change to herself as Jack counted it aloud.

3. If Elsie had paid for her 16-cent loaf of bread with a half dollar, how should Jack have counted her change?

4. Mr. Brown bought a dozen eggs for 42¢. He gave Jack a dollar. Jack had no half dollars. Tell several ways in which he might have made Mr. Brown's change.

5. On the way home from delivering papers, Robert bought a pound of butter for 59¢, a quart of milk for 17¢, and a loaf of bread for 16¢. What was his bill?



A Clerk's Problems

Before Jack Woods got the job as clerk in the store, the owner wanted to know if Jack had done good work in arithmetic. Why do you suppose the owner of the store wanted to know about that?

Every day Jack had problems in arithmetic to work, and it was a very good thing for Jack that he was able to work them correctly.

1. One day Mrs. Rankin bought the following:

6 quarts of strawberries at 25¢ a quart
25 pounds of sugar at 5¢ a pound
4 packages of jar rubbers at 10¢ a package

What did Jack have to do to find the cost of the strawberries? How did he find the cost of the sugar? of the rubbers?

What did Jack have to do to find the cost of all?

2. Mrs. Rankin gave Jack a 5-dollar bill to pay for the berries, sugar, and rubbers. Did Jack find out how much change to give Mrs. Rankin? What did he do?

3. The owner of the grocery told Jack that he had to get $9.00 for 6 baskets of peaches he had for sale. How did Jack find out how much to charge for each?

To solve everyday problems, we must be able to add, subtract, multiply, and divide correctly and quickly.

Reviewing Addition [Self-test]

$$\begin{array}{r} 7 \\ 6 \\ 3 \\ \hline 16 \end{array}$$ addends / sum

When we think numbers together, we **add.** The sign that tells us to add is called the **plus** sign. We write it like this: +.

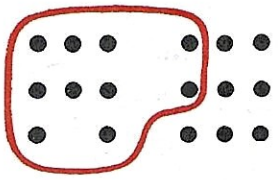
The numbers we add are called **addends.** The answer is called the **sum.**

You must know the 81 additions. You certainly know the 45 "easier" additions, but do you know the 36 "harder" additions?

Say the answers to these addition questions:

8	7	6	6	3	9	5	5	8
9	4	7	5	8	7	9	6	8
6	2	9	7	8	8	4	6	5
6	9	4	6	5	3	9	9	8
6	8	7	4	9	8	9	7	9
8	4	7	8	3	6	9	5	6
4	5	7	7	8	3	9	9	9
7	7	9	8	7	9	8	5	2

Find the answer to any question that you do not know. You may use what you know about ten to find the answer.



Suppose you do not know the answer to $\begin{array}{r} 8 \\ 9 \end{array}$.

Think: Eight and two are ten.
Two from nine is seven.
Ten and seven are seventeen.
Eight and nine are seventeen.

Now study the addition so that you will remember it. Say over and over, "Eight and nine are seventeen."

[Self-test] **Reviewing Subtraction**

97 *minuend*
−35 *subtrahend*
62 *remainder or difference*

When we think numbers away, we **subtract.**
When we compare two numbers, we **subtract.**
We have a sign that tells us to subtract. We call it the **minus** sign. We write it: −.

The number that we subtract is called the **subtrahend.** The larger number from which we subtract is called the **minuend.** The subtraction answer is called the **remainder** or **difference.**

You must know the 81 subtractions. Surely you know the 45 "easier" subtractions, but do you know the 36 "harder" subtractions?

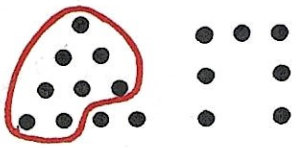
Say the answers to these subtraction questions:

11 − 2	12 − 3	12 − 4	13 − 6	14 − 9	11 − 3	13 − 4	15 − 8	11 − 4
12 − 6	11 − 5	13 − 9	12 − 7	15 − 9	13 − 5	11 − 8	14 − 6	13 − 8
12 − 5	13 − 7	11 − 6	12 − 8	11 − 9	14 − 7	15 − 6	14 − 8	15 − 7
16 − 8	12 − 9	14 − 5	18 − 9	11 − 7	17 − 9	16 − 7	17 − 8	16 − 9

Find the answer to any question that you do not know. You may use what you know about ten to find the answer.

Suppose you do not know the answer to $\begin{array}{r} 17 \\ -8 \\ \hline \end{array}$.

Think: Eight from ten is two.
Two and seven are nine.
Eight from seventeen is nine.



Now study the subtraction so that you will remember it. Say over and over, "Eight from seventeen is nine."

Adding Tens

30	There are no ones to add; so we write 0 in one's place in the answer. Then we add the tens and write 8 in ten's place in the answer.
50	
80	
45	First, we add the ones and write 9 in one's place in the answer. Then we add the tens and write the ten's answer in ten's place.
34	
79	
40	There are only 8 ones; so we write 8 in one's place. Then we add the tens and write the ten's answer in ten's place.
58	
98	
75	First, we add the ones and write the 8 in its proper place. Then we add the tens: Seven and six are thirteen. Thirteen tens are 1 hundred and 3 tens; so we write 1 in hundred's place and 3 in ten's place.
63	
138	

We add tens the way we add ones.

Add these numbers down. Then add up to check.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1.	32	67	60	43	44	53	86	54	80
	45	12	37	52	30	43	12	24	40
2.	56	71	52	77	63	61	51	92	84
	30	34	56	41	55	70	96	64	52
3.	50	62	33	70	78	95	60	72	45
	66	62	76	53	70	41	44	67	70
4.	87	49	92	51	23	91	80	42	30
	70	90	13	78	80	51	61	61	85

Subtracting Tens

There are no ones to subtract; so we write 0 in one's place in the answer. Then we subtract the tens and write 8 in ten's place in the answer.

First, we subtract the ones and write 5 in one's place in the answer. Then we subtract the tens and write 8 in ten's place.

There are no ones to subtract from 7; so we write 7 in one's place. Then we subtract the tens and write 7 in ten's place.

Think: Five from eight is three
Four from ten is six.

There are no ones left when we subtract 8 from 8; so we write 0 in one's place. The 0 puts our ten's answer in ten's place. Then we subtract the tens.

We subtract tens the way we subtract ones.

$$\begin{array}{r} 150 \\ 70 \\ \hline 80 \end{array} \qquad \begin{array}{r} 148 \\ 63 \\ \hline 85 \end{array} \qquad \begin{array}{r} 137 \\ 60 \\ \hline 77 \end{array} \qquad \begin{array}{r} 108 \\ 45 \\ \hline 63 \end{array} \qquad \begin{array}{r} 148 \\ 68 \\ \hline 80 \end{array}$$

Copy and subtract:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1.	160 − 90	120 − 70	109 − 35	147 − 82	158 − 75	137 − 84	108 − 86	119 − 64
2.	128 − 83	139 − 76	157 − 83	118 − 74	107 − 66	127 − 67	135 − 65	124 − 54
3.	169 − 87	178 − 97	143 − 63	138 − 52	149 − 73	106 − 43	115 − 53	119 − 88
4.	108 − 98	119 − 49	109 − 22	116 − 34	117 − 25	172 − 82	166 − 72	156 − 96

Adding and Subtracting Hundreds

We add hundreds the way we add tens and ones.

$$\begin{array}{r} 456 \\ 423 \\ \hline 879 \end{array}$$

First, we add the ones. Next, we add the tens. Last, we add the hundreds.

We write each part of the answer in its proper place, using 0 when we need it.

$$\begin{array}{r} 400 \\ 500 \\ \hline 900 \end{array}$$

Tell how these numbers were added:

434	403	640	600	638	788	405	638
653	502	340	400	520	600	580	520
1087	905	980	1000	1158	1388	985	1158

Copy and add:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
1.	854	643	534	850	760	856	876
	802	444	700	640	712	430	722
2.	407	780	434	529	903	502	656
	660	405	355	670	576	896	713

We subtract hundreds the way we subtract tens and ones.

$$\begin{array}{r} 975 \\ 424 \\ \hline 551 \end{array}$$

First, we subtract the ones, next, the tens, last, the hundreds.

We write each part of the answer in its proper place, using 0 when we need it.

$$\begin{array}{r} 1000 \\ 800 \\ \hline 200 \end{array}$$

Tell how these numbers were subtracted:

850	1286	1592	1086	1488	1697	1308	1500
630	432	770	543	968	997	605	600
220	854	822	543	520	700	703	900

Copy and subtract:

3.	1135	1598	1465	1370	1470	1354	1548
	902	698	903	570	930	930	835
4.	1678	1565	1679	1465	1442	1775	1234
	870	964	900	810	940	825	932

Dollars and Cents

$5.30 is read: *Five dollars and thirty cents.*

Read these amounts of money:

$6.02	$10.05	$12.65	$15.00	$80.10	$1.04
$.80	$.03	$15.60	$20.20	$75.66	$5.50

We write ten dollars and six cents like this: $10.06.

Write with figures these amounts of money:

four cents	one dollar and ten cents	forty cents
sixty dollars	six dollars and six cents	eighty dollars

How do we add and subtract dollars and cents?

$4.65	$ 8.26	$ 9.06	$10.80	$15.90	$17.85
3.20	2.73	8.12	3.50	7.00	9.25
$7.85	$10.99	$17.18	$ 7.30	$ 8.90	$ 8.60

Copy and add:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
1.	$4.45 7.00	$6.70 8.10	$6.10 9.35	$7.15 8.50	$9.05 8.60	$9.00 7.05	$6.05 9.80
2.	$5.00 5.90	$1.90 9.06	$9.50 6.00	$9.50 8.30	$6.45 5.50	$5.10 9.70	$3.54 7.44

Copy and subtract:

	(a)	(b)	(c)	(d)	(e)	(f)
3.	$15.75 7.25	$12.80 8.50	$13.80 7.80	$14.85 9.80	$10.95 8.75	$14.75 7.05
4.	$16.60 7.00	$10.98 5.45	$12.08 7.05	$15.88 9.06	$15.55 9.52	$18.80 9.50
5.	$1.50 .80	$1.65 .90	$1.00 .80	$1.35 .80	$1.75 .75	$1.80 .90

Adding and Subtracting Thousands

How do we add thousands?

4000	3010	3200	3000	3450	5005	4500
5000	5000	5000	5286	5508	4003	5300
9000	8010	8200	8286	8958	9008	9800

Copy and add:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
1.	3000	6000	4040	2400	3426	3605	5453
	5000	2000	5030	4300	3353	3353	2103
2.	1106	4555	3326	2090	4363	5006	2650
	4780	5420	2452	7806	4524	2103	2040

How do we subtract thousands?

6000	9050	10000	10980	11258	12708	14976
4000	4050	5000	7450	4055	4703	5430
2000	5000	5000	3530	7203	8005	9546

Copy and subtract:

	(a)	(b)	(c)	(d)	(e)	(f)
3.	14996	13634	16555	11898	16768	12786
	6654	8230	9530	8234	7262	7150
4.	10870	13786	16982	13860	10904	11777
	5870	6666	7432	4000	9900	5247

Copy and add:

5.	$50.70	$25.75	$70.10	$68.05	$10.10	$20.80
	60.25	80.20	80.05	40.90	75.65	3.15

Copy and subtract:

6.	$125.80	$115.75	$160.85	$95.80	$110.75	$78.95
	80.50	80.25	90.80	25.70	20.70	58.15

Adding by Endings

4 3 7	When we see 14 and 3, we know that the sum is like the sum of 4 and 3, but with a ten.	14 3 17
	Think: 4 and 3 are 7; so 14 and 3 are 17.	
5 4 9	*Think:* 5 and 4 are 9; so 25 and 4 are 29.	25 4 29

1. Study these sums. How are they alike?

6 2 8	16 2 18	26 2 28	36 2 38	46 2 48	5 4 9	15 4 19	35 4 39	45 4 49	65 4 69

2. Say the sums only:

12 4	14 3	20 4	22 6	21 4	32 6	16 3	24 4	22 3	31 4
10 5	11 6	12 5	13 6	14 4	12 7	23 6	14 5	11 3	10 6
20 6	21 5	21 6	22 7	23 5	23 4	24 5	22 4	21 7	24 3
32 3	34 5	35 2	45 4	31 6	34 4	36 2	35 3	37 2	26 3

3. Jane made 12 valentines, and she bought 6 more. How many valentines did she have in all?

4. Joe spent 44¢ for a ticket to the show and 5¢ for a bag of peanuts. How much did he spend for both?

5. June has 42¢. If she had 2 more cents, she could go to the show. How much does a ticket cost?

Adding by Endings

$\begin{array}{r} 6 \\ 4 \\ \hline 10 \end{array}$

We know that 6 and 4 are 10 and that 16 is ten more than 6. So 16 and 4 are 2 tens or 20.

$\begin{array}{r} 16 \\ 4 \\ \hline 20 \end{array}$

$\begin{array}{r} 8 \\ 6 \\ \hline 14 \end{array}$

We know that 8 and 6 are 14 and that 18 is ten more than 8. So 18 and 6 are ten more than 14. 18 and 6 are 24.

$\begin{array}{r} 18 \\ 6 \\ \hline 24 \end{array}$

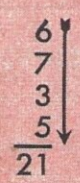
1. Study these examples:

$\begin{array}{r} 6 \\ 5 \\ \hline 11 \end{array}$	$\begin{array}{r} 16 \\ 5 \\ \hline 21 \end{array}$	$\begin{array}{r} 26 \\ 5 \\ \hline 31 \end{array}$	$\begin{array}{r} 36 \\ 5 \\ \hline 41 \end{array}$	$\begin{array}{r} 46 \\ 5 \\ \hline 51 \end{array}$	$\begin{array}{r} 7 \\ 7 \\ \hline 14 \end{array}$	$\begin{array}{r} 17 \\ 7 \\ \hline 24 \end{array}$	$\begin{array}{r} 27 \\ 7 \\ \hline 34 \end{array}$	$\begin{array}{r} 37 \\ 7 \\ \hline 44 \end{array}$	$\begin{array}{r} 47 \\ 7 \\ \hline 54 \end{array}$
$\begin{array}{r} 8 \\ 4 \\ \hline 12 \end{array}$	$\begin{array}{r} 18 \\ 4 \\ \hline 22 \end{array}$	$\begin{array}{r} 28 \\ 4 \\ \hline 32 \end{array}$	$\begin{array}{r} 38 \\ 4 \\ \hline 42 \end{array}$	$\begin{array}{r} 48 \\ 4 \\ \hline 52 \end{array}$	$\begin{array}{r} 8 \\ 2 \\ \hline 10 \end{array}$	$\begin{array}{r} 18 \\ 2 \\ \hline 20 \end{array}$	$\begin{array}{r} 28 \\ 2 \\ \hline 30 \end{array}$	$\begin{array}{r} 38 \\ 2 \\ \hline 40 \end{array}$	$\begin{array}{r} 48 \\ 2 \\ \hline 50 \end{array}$

2. Say the answers:

$\begin{array}{r} 11 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 14 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 3 \\ \hline \end{array}$	$\begin{array}{r} 15 \\ 5 \\ \hline \end{array}$
$\begin{array}{r} 18 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 12 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 19 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 17 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 13 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 18 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 21 \\ 9 \\ \hline \end{array}$
$\begin{array}{r} 22 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 44 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 38 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 22 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 6 \\ \hline \end{array}$
$\begin{array}{r} 36 \\ 6 \\ \hline \end{array}$	$\begin{array}{r} 42 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 38 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 39 \\ 5 \\ \hline \end{array}$	$\begin{array}{r} 23 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 24 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 25 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 26 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 27 \\ 5 \\ \hline \end{array}$
$\begin{array}{r} 32 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 34 \\ 7 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 39 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 39 \\ 8 \\ \hline \end{array}$	$\begin{array}{r} 37 \\ 4 \\ \hline \end{array}$	$\begin{array}{r} 35 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 36 \\ 9 \\ \hline \end{array}$	$\begin{array}{r} 33 \\ 9 \\ \hline \end{array}$

Column Addition

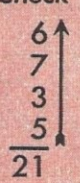


Begin at the top, and add down.

Think: 6 and 7 are 13, and 3 are 16, and 5 are 21.

To check, add up.

Think: 5 and 3 are 8, and 7 are 15, and 6 are 21.



Copy and add:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
1.	7	3	6	9	1	3	7	4	8	6
	7	9	8	1	8	8	9	7	6	5
	6	6	6	8	6	2	6	8	4	9
	5	5	4	7	8	9	5	7	8	7
2.	9	9	6	5	9	4	3	2	6	7
	5	7	8	7	6	8	9	8	6	6
	8	7	8	7	6	8	9	7	7	7
	9	9	6	5	9	4	3	6	7	6
3.	7	5	9	5	9	7	9	3	7	5
	5	9	6	3	8	5	1	8	4	4
	9	6	8	7	2	9	7	6	9	5
	8	8	9	4	9	5	8	8	8	7

Copy and add. Remember to keep the columns straight.

	(a)	(b)	(c)
4.	7 + 8 + 1 + 9 + 4	7 + 4 + 6 + 2 + 5	5 + 7 + 5 + 8 + 5
5.	8 + 4 + 4 + 1 + 5	7 + 7 + 5 + 4 + 1	7 + 2 + 8 + 6 + 8
6.	9 + 2 + 7 + 4 + 7	5 + 7 + 7 + 2 + 8	5 + 7 + 2 + 7 + 6

Carrying When We Add

When we add two-place numbers and the sum of the ones is 10 or more, what do we do with the ten?

$$\begin{array}{r} 78 \\ 42 \\ \hline 120 \end{array}$$

First, add the ones: 8 and 2 are 10. Write 0 in one's place and carry 1 (ten).

Next, add the tens: 1 (carried) and 7 are 8, and 4 are 12.

Copy and add:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1.	67	76	92	58	46	57	95	83	87
	56	58	48	54	54	44	76	98	77
2.	89	67	77	79	87	38	89	35	98
	59	33	25	68	89	77	66	67	53

$$\begin{array}{r} 78 \\ 57 \\ 99 \\ \hline 234 \end{array}$$

Sometimes we carry more than 1 ten.

Add the ones: 8 and 7 are 15, and 9 are 24. Write 4 in one's place and carry 2 (tens).

Add the tens: 2 and 7 are 9, and 5 are 14, and 9 are 23.

Copy and add:

3.	78	89	67	57	46	47	69	68	85
	66	86	79	68	88	47	69	19	29
	56	87	46	95	37	47	69	85	58
4.	70	98	88	88	9	19	89	79	68
	69	30	47	9	89	38	8	96	48
	38	67	70	16	4	76	16	8	96

Sometimes we carry to the hundred's column.

Add the ones: 2 and 5 are 7.

Add the tens: 8 and 6 are 14. Write 4 in ten's place and carry 1 (hundred).

Add the hundreds: 1 and 2 are 3, and 4 are 7.

$$\begin{array}{r} 282 \\ 465 \\ \hline 747 \end{array}$$

Copy and add:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1.	524	382	580	490	635	275	370	497
	294	385	378	390	293	660	570	250
2.	567	480	353	763	680	460	784	980
	590	578	680	276	846	660	765	991

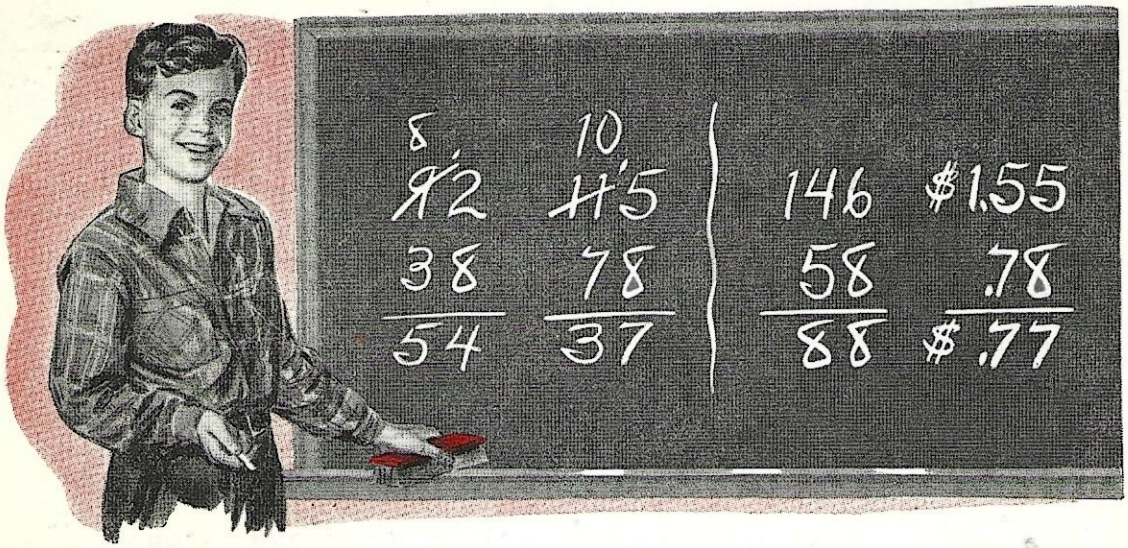
Sometimes we carry twice.

Add the ones: 8 and 7 are 15. Write 5 and carry 1. Then add the tens: 1 and 2 are 3, and 7 are 10. Write 0 in ten's place and carry 1. Now add the hundreds: 1 and 5 are 6, and 4 are 10.

$$\begin{array}{r} 528 \\ 477 \\ \hline 1005 \end{array}$$

Copy and add:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
3.	389	489	698	598	498	366	165	448
	512	223	45	57	168	264	755	455
4.	987	798	745	897	781	765	487	367
	833	474	866	695	699	765	578	689
5.	416	654	646	572	682	567	375	698
	889	497	688	479	788	766	58	64



Using a Ten in Subtracting

1. Explain each example on the board.

Copy and subtract:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
2.	81 43	95 77	64 29	73 56	132 53	157 68	112 35	142 66	133 88
3.	161 99	112 87	153 86	131 54	132 43	164 75	117 68	163 87	142 88
4.	144 98	115 78	177 99	155 66	155 89	158 69	145 87	163 79	184 87

Copy and subtract:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
5.	$1.72 .75	$1.21 .84	$1.82 .96	$1.46 .58	$1.15 .49	$1.63 .78	$1.56 .88
6.	$1.35 .77	$1.28 .39	$1.62 .78	$1.72 .85	$1.83 .94	$1.64 .96	$1.75 .88

Carrying Back

First, subtract the ones.

Next, subtract the tens. Carry back one of the 4 hundreds and use it with the 3 tens that you have. 5 from 13 is 8.

Now subtract the hundreds: 1 from 3 is 2.

$$\begin{array}{r} {}^{3}\not{4}{}^{1}38 \\ 1\ 56 \\ \hline 2\ 82 \end{array}$$

Copy and subtract:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1.	518 332	629 243	839 554	748 555	929 566	646 365	865 370	670 490
2.	784 390	851 291	854 174	562 372	766 480	757 487	965 392	846 486

Sometimes we carry back 1 ten and 1 hundred.

642 — 285 — 357

First, subtract the ones.
Next, subtract the tens.
Last, subtract the hundreds.

Think

$$\begin{array}{r} {}^{5}\not{6}\ {}^{13}\not{4}{}^{1}2 \\ 2\ 8\ 5 \\ \hline 3\ 5\ 7 \end{array}$$

	(a)	(b)	(c)	(d)	(e)	(f)	(g)
3.	588 199	972 774	\$3.15 1.48	\$12.26 7.89	\$15.81 6.74	\$8.23 2.75	\$8.62 .86
4.	1554 878	1754 867	1535 768	1656 889	1787 999	1635 789	1451 899
5.	1453 877	1653 876	1578 789	1232 789	1456 967	1224 896	1657 799

Zeros in Subtraction

$\begin{array}{r} {\scriptstyle 79} \\ \cancel{80}^{1}0 \\ 31\ 6 \\ \hline 48\ 4 \end{array}$	800 is 80 tens. We use 1 of the 80 tens and have 79 left.

1. Tell how these examples were worked:

$\begin{array}{r} {\scriptstyle 5\,9\,9} \\ \cancel{600}^{1}0 \\ 435\ 1 \\ \hline 164\ 9 \end{array}$ $\begin{array}{r} {\scriptstyle 3\,9} \\ \cancel{40}^{1}2 \\ 29\ 6 \\ \hline 10\ 6 \end{array}$ $\begin{array}{r} {\scriptstyle 3\,9} \\ \cancel{40}^{1}06 \\ 19\ 64 \\ \hline 20\ 42 \end{array}$ $\begin{array}{r} {\scriptstyle 6\,9\,14} \\ \cancel{70}\ \cancel{5}^{1}0 \\ 24\ 9\ 1 \\ \hline 45\ 5\ 9 \end{array}$

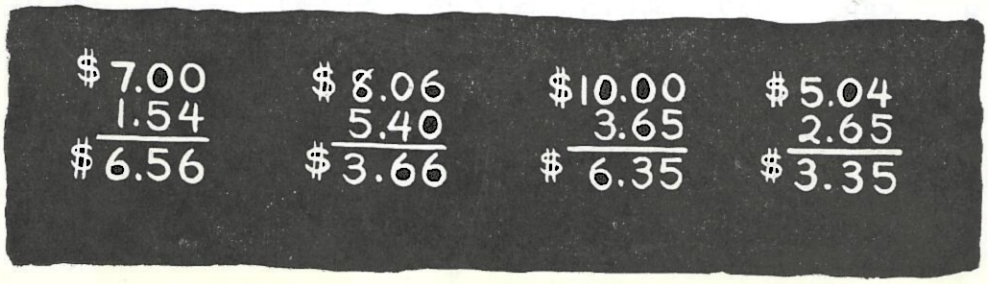
Copy and subtract:

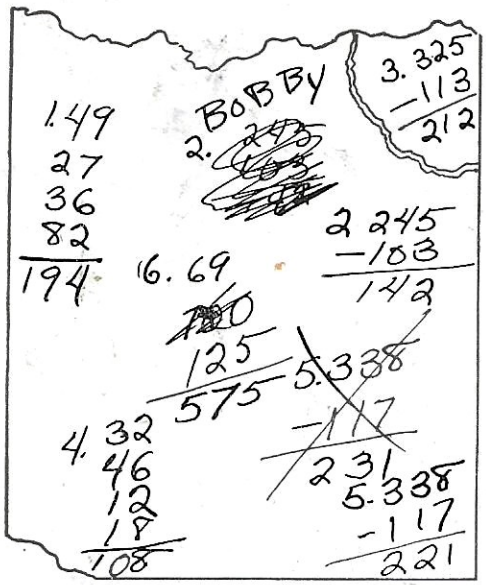
	(a)	(b)	(c)	(d)	(e)	(f)	(g)
2.	100 − 25	200 − 176	500 − 204	680 − 356	902 − 538	1000 − 250	1000 − 256
3.	500 − 182	507 − 295	802 − 548	600 − 499	820 − 367	3003 − 2967	5002 − 1686

4. Copy and subtract:

(a)	(b)	(c)	(d)	(e)	(f)	(g)
\$10.00 − 7.50	\$6.00 − 2.07	\$7.05 − 4.98	\$1.00 − .45	\$1.05 − .09	\$1.30 − .80	\$5.00 − 1.10

5. Three of the examples on the board are wrong. Find the mistakes and correct them.





Arithmetic

Jim Mason November 2, 19--

1. 49
27
36
82
194

2. 245
−103
142

3. 325
−113
212

4. 32
46
12
18
108

5. 338
−117
221

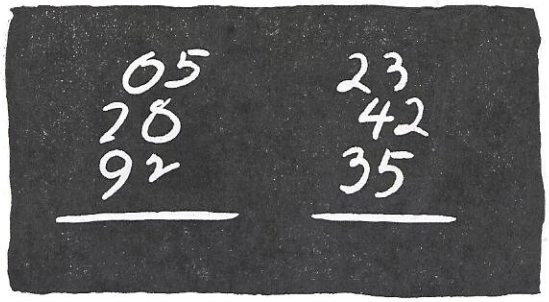
6. 69
−125
575

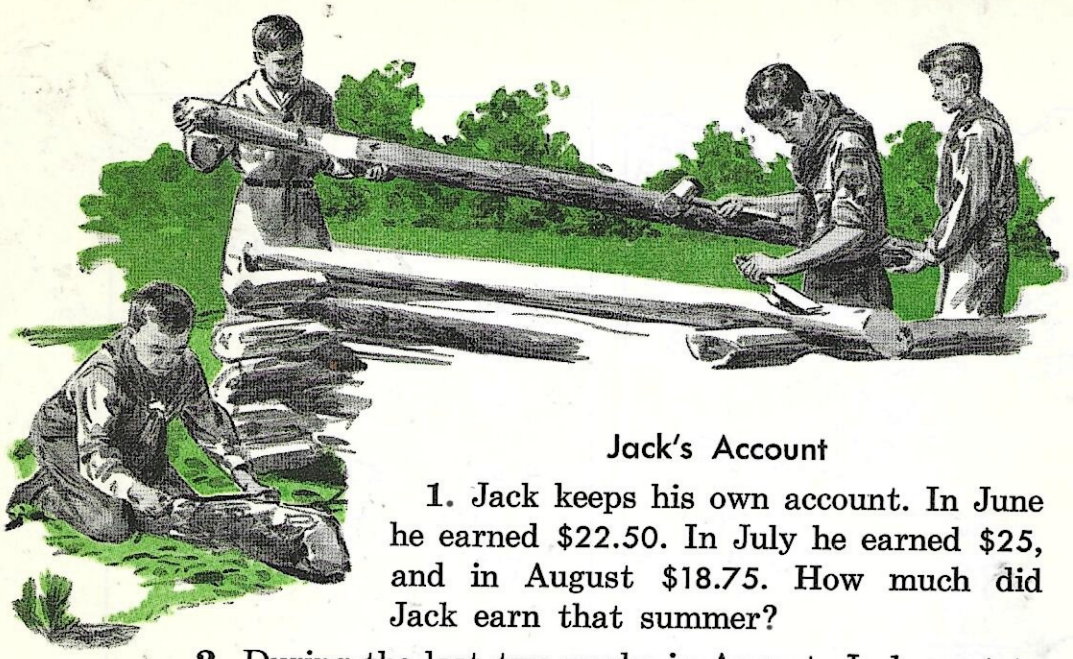
Writing Neat Papers

These arithmetic papers were written by two boys in the same class. Why is Jim's paper better than Bobby's?

Do you think it is a good plan to scratch out an example as Bobby scratched out example 2? See how neatly he crossed out example 5.

How do neat figures help you? Children often make mistakes in addition and subtraction when they do not make their figures well. Why should you write the figures in a straight column?





Jack's Account

1. Jack keeps his own account. In June he earned \$22.50. In July he earned \$25, and in August \$18.75. How much did Jack earn that summer?

2. During the last two weeks in August, Jack went to Boy Scout Camp. His expenses the first week were \$8.45. The second week they were \$7.65. How much were his expenses for the whole time he was in camp?

3. When Jack got home, he bought a suit and an overcoat for \$28.75. How much did he spend altogether for camp and new clothes?

4. How much of the money that Jack earned during the summer did he have left after he paid for his camp expenses and clothes?

5. That fall Jack's schoolbooks cost \$6.75. How much money did he have left after he paid for them?

6. Jack wanted a new bicycle that cost \$28.95, but he had only \$14.65. His father offered to give him the amount of money he needed so that he could have his bicycle to use while the weather was nice. How much money did Jack need?

Practice | Test

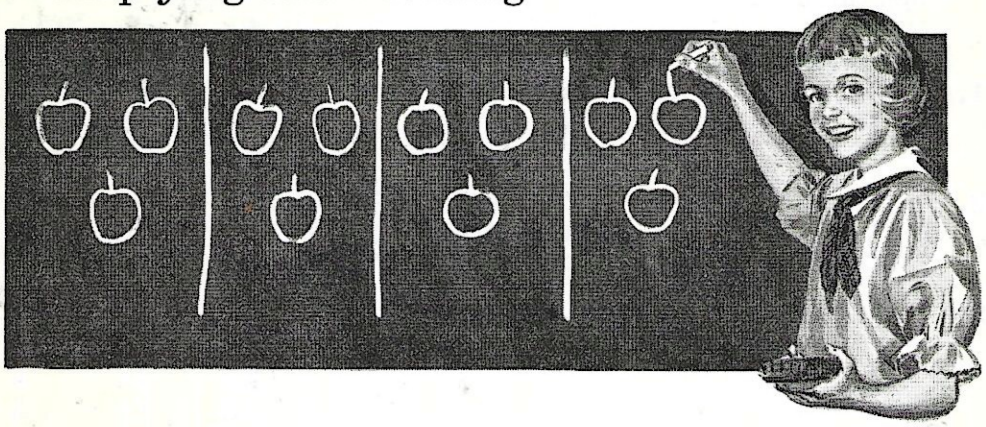
Copy and add:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1.	43	27	63	50	30	94	52	84	70
	52	42	30	65	98	49	48	68	85
2.	564	247	624	178	655	895	777	684	921
	356	219	167	541	239	115	334	526	179
3.	8	8	6	14	17	82	79	18	31
	7	2	0	19	25	37	36	6	12
	6	0	7	3	66	65	68	57	8
	5	7	8	10	96	20	48	75	5
	4	9	5	6	43	54	87	66	38
4.	165	287	393	476	555	667	876	678	448
	98	102	560	457	80	155	100	51	248
	160	190	350	288	109	84	108	9	22
	446	258	49	104	18	107	96	106	10

Copy and subtract:

	(a)	(b)	(c)	(d)	(e)	(f)
5.	98	65	90	89	43	69
	28	42	30	7	8	64
6.	842	653	168	149	134	752
	512	511	77	61	129	628
7.	$9.65	$3.00	$40.34	$70.04	$46.00	$13.80
	8.15	1.23	31.38	58.50	6.06	6.76
8.	7884	4222	7004	8586	6222	5000
	1997	1057	1630	2490	5245	1648

Chapter 2
Multiplying and Dividing



When we think equal groups together, we **multiply**. The sign (×) that tells us to multiply is called the **multiplication** sign, or **times** sign.

$\begin{array}{r} 3 \\ \times 4 \\ \hline \end{array}$ $\begin{array}{r} 3 \\ \times 4 \\ \hline 12 \end{array}$

$4 \times 3 =$ Four threes are how many? Four threes are twelve. $4 \times 3 = 12$

When we separate a group into a number of equal groups, we **divide**. When we separate an object into a number of equal parts, we **divide**.

This sign (÷) and this sign ($)\overline{}$) tell us to divide.

$3\overline{)12}$ $\begin{array}{r} 4 \\ 3\overline{)12} \end{array}$

$12 \div 3 =$ How many 3's are in 12? There are four 3's in 12. $12 \div 3 = 4$

$12 \div 3$ means: **Divide 12 by 3.**

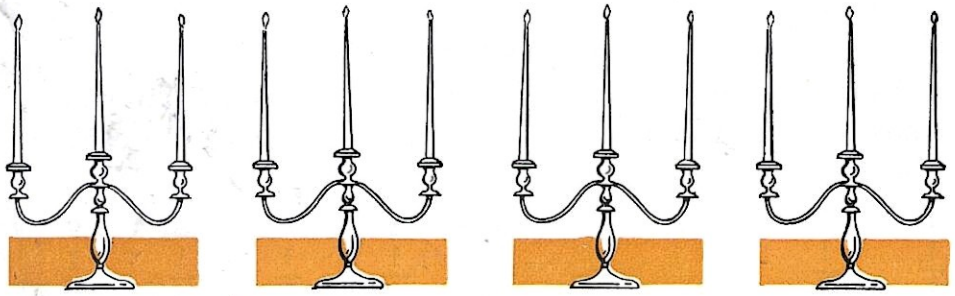
$12 \div 3 = 4$ is read: **Twelve divided by 3 is four.**

[Self-test]

The 81 Multiplications

Here are the 81 multiplications. How many do you know? Cover the answers. Then say the answer to each question:

1	2	3	4	5	6	7	8	9
1	1	1	1	1	1	1	1	1
1	2	3	4	5	6	7	8	9
2	2	2	2	2	2	2	2	2
2	4	6	8	10	12	14	16	18
1	2	3	4	5	6	7	8	9
3	3	3	3	3	3	3	3	3
3	6	9	12	15	18	21	24	27
1	2	3	4	5	6	7	8	9
4	4	4	4	4	4	4	4	4
4	8	12	16	20	24	28	32	36
1	2	3	4	5	6	7	8	9
5	5	5	5	5	5	5	5	5
5	10	15	20	25	30	35	40	45
1	2	3	4	5	6	7	8	9
6	6	6	6	6	6	6	6	6
6	12	18	24	30	36	42	48	54
1	2	3	4	5	6	7	8	9
7	7	7	7	7	7	7	7	7
7	14	21	28	35	42	49	56	63
1	2	3	4	5	6	7	8	9
8	8	8	8	8	8	8	8	8
8	16	24	32	40	48	56	64	72
1	2	3	4	5	6	7	8	9
9	9	9	9	9	9	9	9	9
9	18	27	36	45	54	63	72	81



The 81 Divisions [Self-test]

Here are the 81 divisions. Study them.

$1\overline{)1}$	$1\overline{)2}$	$1\overline{)3}$	$1\overline{)4}$	$1\overline{)5}$	$1\overline{)6}$	$1\overline{)7}$	$1\overline{)8}$	$1\overline{)9}$
$2\overline{)2}$	$2\overline{)4}$	$2\overline{)6}$	$2\overline{)8}$	$2\overline{)10}$	$2\overline{)12}$	$2\overline{)14}$	$2\overline{)16}$	$2\overline{)18}$
$3\overline{)3}$	$3\overline{)6}$	$3\overline{)9}$	$3\overline{)12}$	$3\overline{)15}$	$3\overline{)18}$	$3\overline{)21}$	$3\overline{)24}$	$3\overline{)27}$
$4\overline{)4}$	$4\overline{)8}$	$4\overline{)12}$	$4\overline{)16}$	$4\overline{)20}$	$4\overline{)24}$	$4\overline{)28}$	$4\overline{)32}$	$4\overline{)36}$
$5\overline{)5}$	$5\overline{)10}$	$5\overline{)15}$	$5\overline{)20}$	$5\overline{)25}$	$5\overline{)30}$	$5\overline{)35}$	$5\overline{)40}$	$5\overline{)45}$
$6\overline{)6}$	$6\overline{)12}$	$6\overline{)18}$	$6\overline{)24}$	$6\overline{)30}$	$6\overline{)36}$	$6\overline{)42}$	$6\overline{)48}$	$6\overline{)54}$
$7\overline{)7}$	$7\overline{)14}$	$7\overline{)21}$	$7\overline{)28}$	$7\overline{)35}$	$7\overline{)42}$	$7\overline{)49}$	$7\overline{)56}$	$7\overline{)63}$
$8\overline{)8}$	$8\overline{)16}$	$8\overline{)24}$	$8\overline{)32}$	$8\overline{)40}$	$8\overline{)48}$	$8\overline{)56}$	$8\overline{)64}$	$8\overline{)72}$
$9\overline{)9}$	$9\overline{)18}$	$9\overline{)27}$	$9\overline{)36}$	$9\overline{)45}$	$9\overline{)54}$	$9\overline{)63}$	$9\overline{)72}$	$9\overline{)81}$

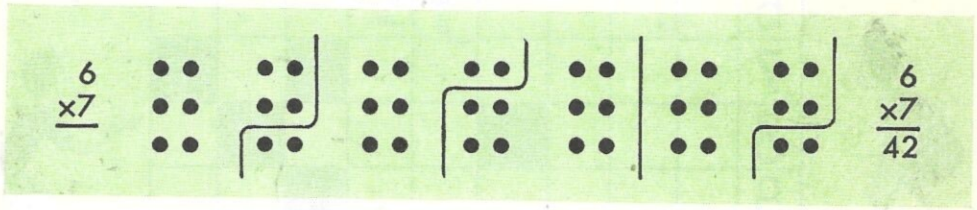
Cover the answers. Now say the answer to each division question above. How many do you know?

Practice

Say the answer to each multiplication question, but do not guess.

8 ×7	4 ×7	5 ×8	7 ×7	9 ×4	6 ×9	6 ×6	5 ×6	8 ×4
9 ×6	9 ×7	8 ×9	7 ×8	9 ×8	6 ×7	6 ×8	8 ×8	7 ×9

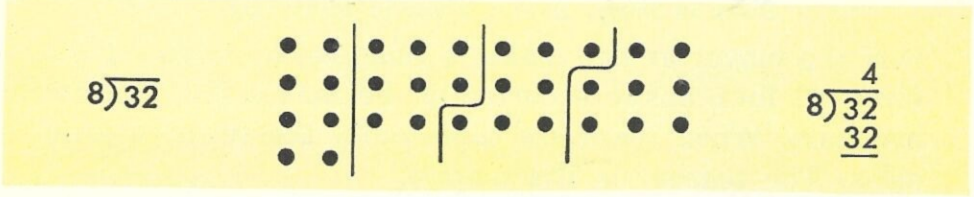
Find the answer to any question that you did not know. Then study that multiplication so that you will remember it.

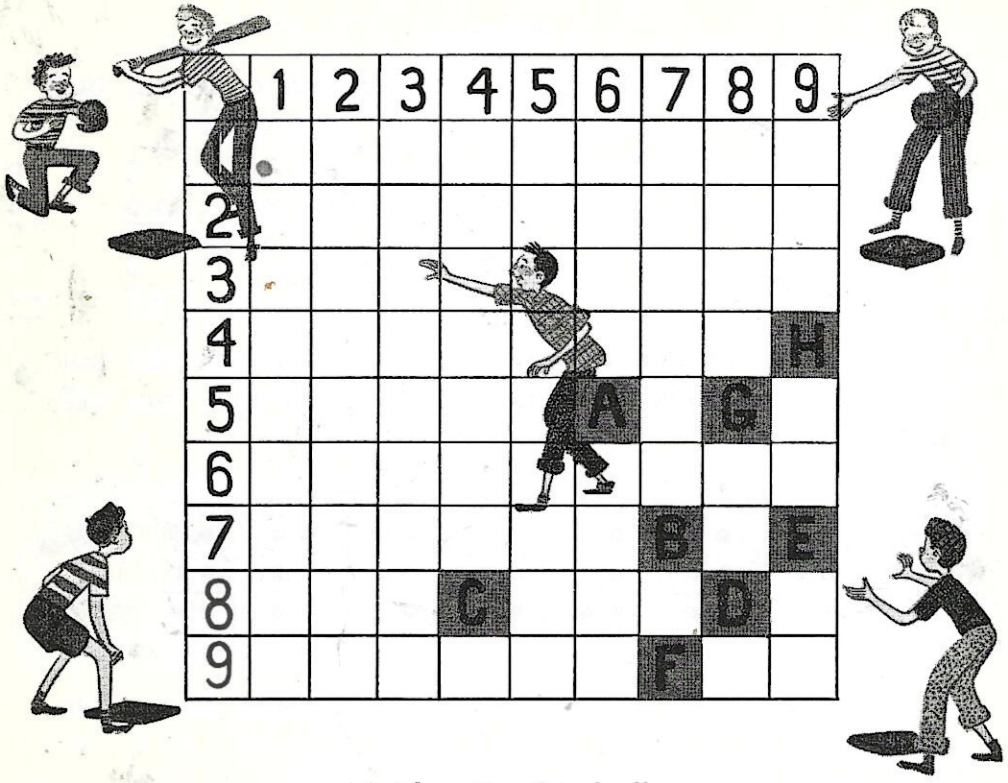


Say the answer to each division question below. Do not guess.

$8\overline{)56}$	$9\overline{)45}$	$6\overline{)54}$	$9\overline{)63}$	$8\overline{)48}$	$8\overline{)64}$	$7\overline{)63}$	$9\overline{)72}$
$9\overline{)54}$	$9\overline{)81}$	$7\overline{)49}$	$8\overline{)40}$	$7\overline{)56}$	$8\overline{)72}$	$7\overline{)42}$	$9\overline{)36}$
$6\overline{)30}$	$7\overline{)28}$	$6\overline{)42}$	$4\overline{)36}$	$6\overline{)48}$	$8\overline{)32}$	$5\overline{)45}$	$3\overline{)27}$

Find the answer to any question that you did not know. Then study that division so that you will remember it.





Arithmetic Baseball

Choose sides so that the class is divided into two teams. Each player on the team at bat takes his turn. A player on the other team is the pitcher. The pitcher points to a block, such as A. The player at bat may give the answers in this way:

Six fives are thirty. *Five sixes are thirty.*
Sixes in thirty, five. *Fives in thirty, six.*

If the player at bat makes a mistake, he is out. If he gives all four answers correctly, he makes one run for his team. When there are three outs, the teams change sides. The teacher is the umpire.

Baseball with Products

As in the game just described, the class should choose sides. Each player on the team at bat takes his turn, and a player on the other team acts as the pitcher. In this game, also, each completely correct answer counts one run, and the team at bat has three outs.

The pitcher tosses a product, say 48. The player at bat must answer in this way:

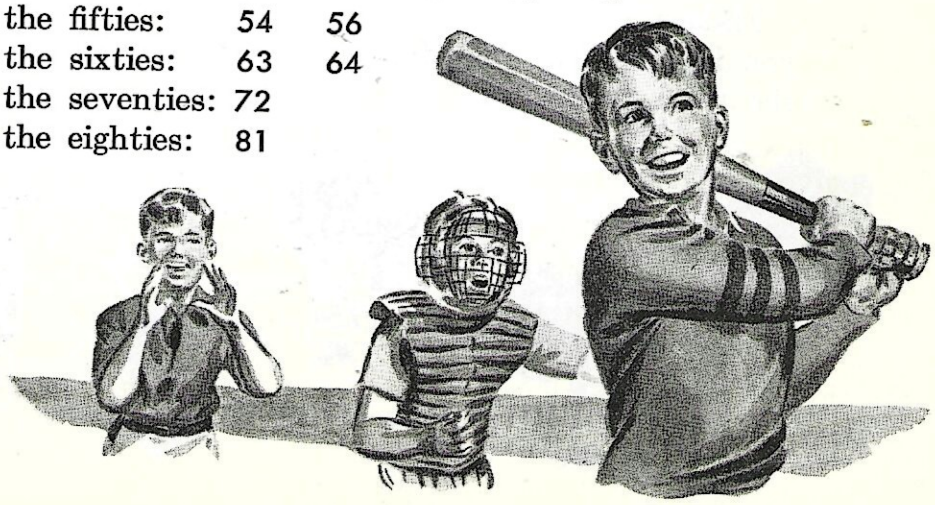
Six eights are forty-eight.
Eight sixes are forty-eight.
Sixes in forty-eight, eight.
Eights in forty-eight, six.

$$\begin{array}{r} 8 \\ \times 6 \\ \hline 48 \end{array} \qquad \begin{array}{r} 6 \\ \times 8 \\ \hline 48 \end{array} \qquad 6\overline{)48} \qquad 8\overline{)48}$$

The answers do not have to be in this order, but they must be completely correct to count 1 run. Any mistake means 1 out, and when there are 3 outs, the teams change sides.

Here are some useful products:

In the twenties:	20	21	24	25	27	28
In the thirties:	30	32	35	36		
In the forties:	40	42	45	48	49	
In the fifties:	54	56				
In the sixties:	63	64				
In the seventies:	72					
In the eighties:	81					



When Do We Multiply?

Mr. Wagner was ordering some apple trees and peach trees from the catalogue that the nursery sent him. He asked Bill to find the total cost for him.

1. How much will 1 Grimes Golden at 65¢, 1 Delicious at 85¢, and 1 Jonathan at 49¢ cost altogether?

$$\begin{array}{r} \$\ .65 \\ .85 \\ .49 \\ \hline \$1.99 \end{array}$$

To find the total cost of the apple trees, Bill added 65¢, 85¢, and 49¢. He found that the total cost would be $1.99.

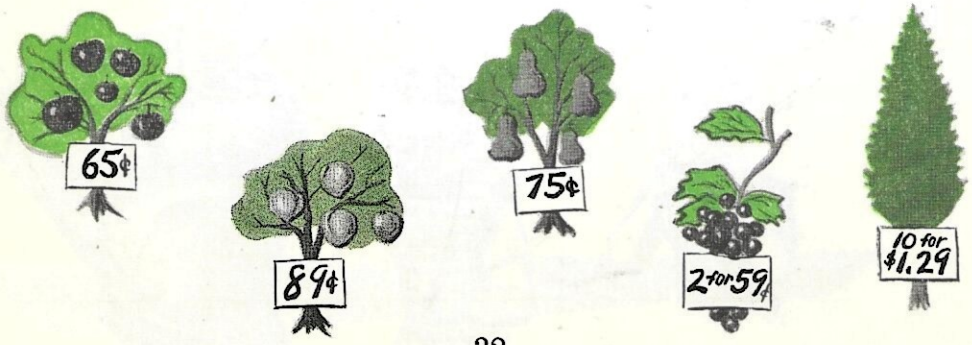
2. Now find the total cost of 3 Elberta Peach trees at 89¢ each.

$$\begin{array}{r} \$\ .89 \\ 3 \\ \hline \$2.67 \end{array}$$

Again Bill had to find the total cost. He could have added 89¢, 89¢, and 89¢, but he just multiplied 89¢ by 3 to save time.

Sometimes we add to find the total amount, and sometimes we multiply to find the total amount. When do we add to find the total amount? When do we multiply to find the total amount?

Make up problems, using the pictures, to show that you know when to add and when to multiply to find the total amount.



How Do We Multiply?

1. Jane and her mother bought 2 crates of cherries at the fruit stand. There were 24 boxes of cherries in each crate. How many boxes of cherries did they buy?

To find the answer, we multiply 24 by 2.
We multiply the ones first: Two 4's are 8. Write 8 in one's place in the answer. Then multiply the tens: Two 2's are 4. Write 4 in ten's place.

They bought 48 boxes of cherries.

$$\begin{array}{r} 24 \\ \times 2 \\ \hline 48 \end{array}$$

2. There are 144 pieces of chalk in each box. How many pieces are there in 2 boxes?

Multiply the ones: Two 4's are 8.
Multiply the tens: Two 4's are 8.
Multiply the hundreds: Two 1's are 2.
There are 288 pieces in the 2 boxes.

$$\begin{array}{r} 144 \\ \times 2 \\ \hline 288 \end{array}$$

The number we multiply is the **multiplicand**, and the number we multiply by is the **multiplier**. The answer is the **product**.

$$\begin{array}{rl} 423 & \textit{multiplicand} \\ \times 3 & \textit{multiplier} \\ \hline 1269 & \textit{product} \end{array}$$

Copy and multiply:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
3.	63 × 2	73 × 3	11 × 8	82 × 4	41 × 9	51 × 8	32 × 3	61 × 5	71 × 7
4.	93 × 3	92 × 4	91 × 5	82 × 3	83 × 3	74 × 2	51 × 7	62 × 4	81 × 8
5.	621 × 4	811 × 7	821 × 3	711 × 5	831 × 3	532 × 3	624 × 2	522 × 4	513 × 3

Zeros in Multiplication

$$\begin{array}{r} 50 \\ \times\ 2 \\ \hline 100 \end{array}$$

Since there are **no ones** to multiply by 2, we write 0 in one's place in the answer. Then we multiply the tens: Two 5's are 10. Ten 10's are 100; so we write 0 in ten's place and 1 in hundred's place.

$$\begin{array}{r} 403 \\ \times\ 3 \\ \hline 1209 \end{array}$$

Multiply the ones first: Three 3's are 9. Write 9 in one's place. Next multiply the tens. There are **no tens** to multiply by 3; so we write 0 in ten's place. Then we multiply the hundreds: Three 4's are 12. 12 hundreds are 1 thousand and 2 hundreds. We write 2 in hundred's place and 1 in thousand's place.

Tell how these numbers were multiplied:

$\begin{array}{r} 500 \\ \times\ 4 \\ \hline 2000 \end{array}$	$\begin{array}{r} 502 \\ \times\ 4 \\ \hline 2008 \end{array}$	$\begin{array}{r} 520 \\ \times\ 4 \\ \hline 2080 \end{array}$	$\begin{array}{r} 400 \\ \times\ 3 \\ \hline 1200 \end{array}$	$\begin{array}{r} 403 \\ \times\ 3 \\ \hline 1209 \end{array}$	$\begin{array}{r} 430 \\ \times\ 3 \\ \hline 1290 \end{array}$	$\begin{array}{r} 740 \\ \times\ 2 \\ \hline 1480 \end{array}$	$\begin{array}{r} 901 \\ \times\ 9 \\ \hline 8109 \end{array}$

Copy and multiply:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1.	$\begin{array}{r} 70 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 90 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 80 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 90 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 60 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 70 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 80 \\ \times\ 5 \\ \hline \end{array}$	$\begin{array}{r} 40 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 50 \\ \times\ 7 \\ \hline \end{array}$
2.	$\begin{array}{r} 701 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 710 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 800 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 630 \\ \times\ 3 \\ \hline \end{array}$	$\begin{array}{r} 604 \\ \times\ 2 \\ \hline \end{array}$	$\begin{array}{r} 640 \\ \times\ 2 \\ \hline \end{array}$	$\begin{array}{r} 810 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 810 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 602 \\ \times\ 4 \\ \hline \end{array}$
3.	$\begin{array}{r} 120 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 103 \\ \times\ 3 \\ \hline \end{array}$	$\begin{array}{r} 401 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 501 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 420 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 530 \\ \times\ 3 \\ \hline \end{array}$	$\begin{array}{r} 901 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 910 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 700 \\ \times\ 7 \\ \hline \end{array}$
4.	$\begin{array}{r} 643 \\ \times\ 2 \\ \hline \end{array}$	$\begin{array}{r} 703 \\ \times\ 3 \\ \hline \end{array}$	$\begin{array}{r} 411 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 720 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 322 \\ \times\ 2 \\ \hline \end{array}$	$\begin{array}{r} 202 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 820 \\ \times\ 3 \\ \hline \end{array}$	$\begin{array}{r} 413 \\ \times\ 2 \\ \hline \end{array}$	$\begin{array}{r} 230 \\ \times\ 3 \\ \hline \end{array}$

Problems

Read each problem carefully. What does the question ask you to find? Must you add, subtract, or multiply to find the answer to the question?

1. Jane bought 3 packages of post cards when she went to the city to visit her aunt. There were 12 post cards in each package. How many post cards did she buy?

2. The girls in the Camp Fire group have made 27 place cards for the Camp Fire dinner, but they need 50 place cards in all. How many place cards do they still have to make?

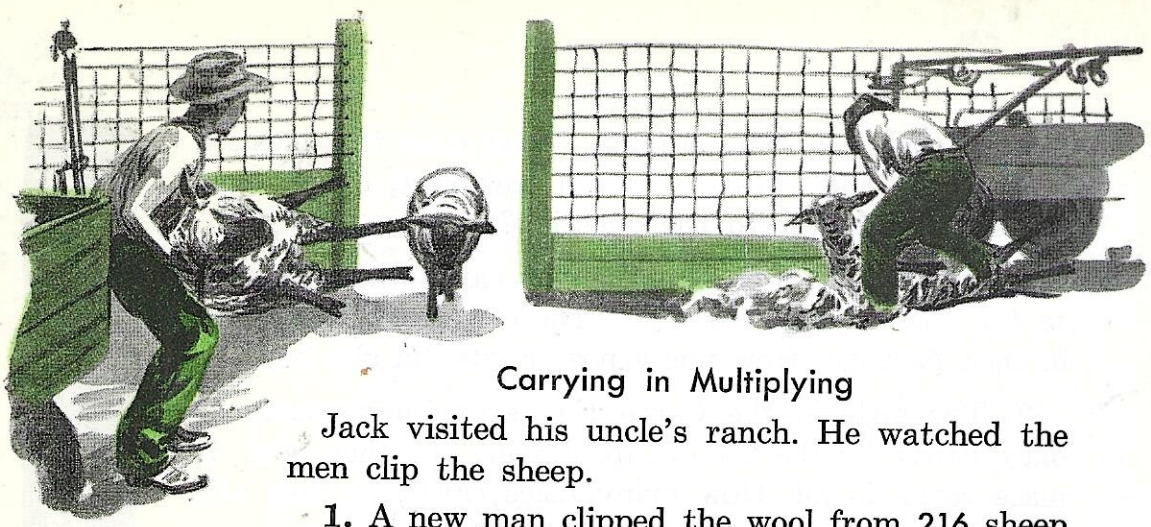
3. May got 6 birthday cards the day before her birthday, 27 on her birthday, and 9 the day after. How many birthday cards did she get in all?

4. The fifth-grade girls sold 235 tickets for their play. The boys sold 309. How many more tickets did the boys sell than the girls? How many tickets did they sell altogether?

5. To decide how many quarts of fruit to can this fall, Grace and her mother want to know how many quarts they used last winter. They canned 215 quarts last year and have 37 quarts left. How many quarts did they use last winter?

6. Jimmy Brown lives 24 miles from the city. How many miles would he travel in going to the city and back home again?

7. Jane had 47 shells in her collection before Jack brought her 18 more from Florida. How many shells did Jane have then?



Carrying in Multiplying

Jack visited his uncle's ranch. He watched the men clip the sheep.

1. A new man clipped the wool from 216 sheep in one day. How many sheep can he clip in 5 days?

$$\begin{array}{r} 216 \\ \times\ 5 \\ \hline 1080 \end{array}$$

First, we multiply the ones: Five 6's are 30. We write 0 and carry 3. Next, we multiply the tens: Five 1's are 5, and 3 (carried) are 8. We write 8 in ten's place. Then we multiply the hundreds: Five 2's are 10.

$8 \times 5 + 4 = 44$ *Think:* Eight 5's are 40, and 4 are 44.

Think each of the following:

2.	$7 \times 8 + 6$	$3 \times 7 + 2$	$8 \times 2 + 4$	$6 \times 7 + 3$
3.	$4 \times 6 + 3$	$2 \times 9 + 1$	$9 \times 2 + 5$	$8 \times 4 + 7$
4.	$6 \times 6 + 5$	$9 \times 4 + 5$	$3 \times 5 + 2$	$9 \times 9 + 7$
5.	$8 \times 5 + 7$	$7 \times 3 + 6$	$6 \times 4 + 5$	$5 \times 6 + 4$
6.	$5 \times 7 + 3$	$6 \times 8 + 2$	$8 \times 6 + 4$	$7 \times 7 + 1$
7.	$6 \times 9 + 3$	$9 \times 6 + 6$	$9 \times 8 + 8$	$5 \times 5 + 4$
8.	$9 \times 3 + 2$	$4 \times 8 + 2$	$5 \times 9 + 3$	$8 \times 7 + 5$

9. Another man clipped the wool from 271 sheep in one day. How many sheep can he clip in 5 days?

$$\begin{array}{r} 271 \\ \times\ 5 \\ \hline 1355 \end{array}$$

10. A third man clipped the wool from 286 sheep in one day. How many sheep can he clip in 5 days?

$$\begin{array}{r} 286 \\ \times\ 5 \\ \hline 1430 \end{array}$$

11. The clipped wool from one sheep weighs about 8 lb. About how much will the wool from 216 sheep weigh? from 271 sheep? from 286 sheep?

12. Tell how these numbers were multiplied:

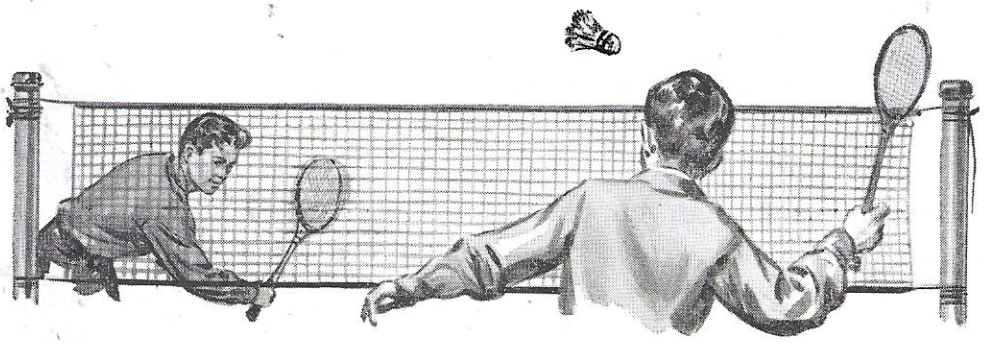
$\begin{array}{r} 415 \\ \times\ 6 \\ \hline 2490 \end{array}$	$\begin{array}{r} 408 \\ \times\ 8 \\ \hline 3264 \end{array}$	$\begin{array}{r} 432 \\ \times\ 8 \\ \hline 3456 \end{array}$	$\begin{array}{r} 525 \\ \times\ 4 \\ \hline 2100 \end{array}$	$\begin{array}{r} 619 \\ \times\ 7 \\ \hline 4333 \end{array}$	$\begin{array}{r} 551 \\ \times\ 8 \\ \hline 4408 \end{array}$

Copy and multiply:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
13.	$\begin{array}{r} 315 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 413 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 514 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 106 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 712 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 918 \\ \times\ 2 \\ \hline \end{array}$	$\begin{array}{r} 204 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 709 \\ \times\ 5 \\ \hline \end{array}$	$\begin{array}{r} 306 \\ \times\ 8 \\ \hline \end{array}$
14.	$\begin{array}{r} 641 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 381 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 971 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 350 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 621 \\ \times\ 5 \\ \hline \end{array}$	$\begin{array}{r} 342 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 341 \\ \times\ 9 \\ \hline \end{array}$	$\begin{array}{r} 631 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 651 \\ \times\ 4 \\ \hline \end{array}$
15.	$\begin{array}{r} 561 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 235 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 863 \\ \times\ 7 \\ \hline \end{array}$	$\begin{array}{r} 546 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 469 \\ \times\ 4 \\ \hline \end{array}$	$\begin{array}{r} 578 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 982 \\ \times\ 8 \\ \hline \end{array}$	$\begin{array}{r} 973 \\ \times\ 6 \\ \hline \end{array}$	$\begin{array}{r} 578 \\ \times\ 3 \\ \hline \end{array}$

16. Some of the examples on the board are wrong. Find each mistake and correct it.

$\begin{array}{r} 845 \\ \times\ 4 \\ \hline 3280 \end{array}$	$\begin{array}{r} 606 \\ \times\ 7 \\ \hline 422 \end{array}$	$\begin{array}{r} 905 \\ \times\ 4 \\ \hline 3620 \end{array}$	$\begin{array}{r} 785 \\ \times\ 4 \\ \hline 2922 \end{array}$



Multiplying Dollars and Cents

Jack and Jim wanted to learn to play badminton; so they had to order rackets and birds.

$$\begin{array}{r} \$1.29 \\ \times\ 2 \\ \hline \$2.58 \end{array}$$

$$\begin{array}{r} \$2.72 \\ \times\ 2 \\ \hline \$5.44 \end{array}$$

$$\begin{array}{r} \$3.79 \\ \times\ 2 \\ \hline \$7.58 \end{array}$$

1. Jack ordered 2 sets of birds. How much did they cost at \$1.29 a set?

We multiply dollars and cents the way we multiply other numbers, but we must write dollars and cents in their proper places. Where do we put the point in our answer?

2. Jack also ordered a racket for each of them. How much did the 2 rackets cost at \$2.72 each?

3. There was a better racket that sold for \$3.79. How much would 2 of these cost?

4. If Jack had ordered the racket for \$2.72 and Jim had ordered the racket for \$3.79, how much would these 2 rackets have cost?

Copy and multiply:

	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*f*)	(*g*)
5.	\$1.50 × 8	\$1.27 × 4	\$2.46 × 5	\$3.89 × 6	\$4.56 × 3	\$9.75 × 5	\$.35 × 9
6.	\$8.64 × 8	\$9.15 × 7	\$7.25 × 6	\$5.65 × 7	\$4.86 × 8	\$7.36 × 9	\$.42 × 8

Practice

Copy and add. Check your work.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
1.	8	17	8	78	6	8	7	45	9	28
	9	79	8	88	4	43	0	17	8	19
	7	88	6	46	7	19	9	66	0	36
	6	45	0	57	8	62	8	80	7	48
	5	56	4	25	6	87	5	58	6	5

Copy and multiply. Check your answers.

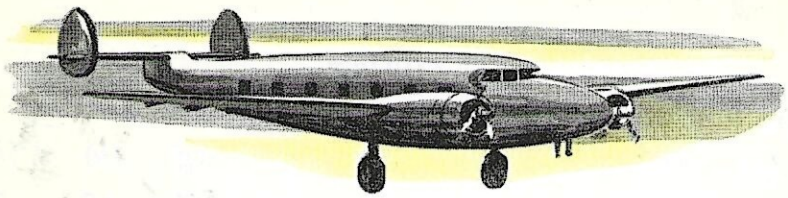
2.	96	80	77	58	47	91	39	68	76	86
	7	5	6	8	9	9	7	9	8	7
3.	245	387	503	630	800	755	780	909	877	919
	9	8	8	8	9	7	7	9	9	8

Copy, subtract, and check.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
4.	8512	5000	5006	1830	4900	8704	1240	8500
	2278	2985	1874	497	4347	3536	780	930

In row **5**, add; in **6**, subtract; in **7**, multiply.

	(a)	(b)	(c)	(d)	(e)	(f)
5.	\$1.75	\$5.00	\$6.40	\$3.84	\$12.40	\$10.80
	4.35	.80	.57	4.75	8.60	5.60
	4.08	6.15	.08	.92	20.10	4.37
	3.62	3.98	1.76	1.08	7.00	3.80
6.	\$20.00	\$12.60	\$10.00	\$8.32	\$7.30	\$5.82
	8.75	5.86	2.98	5.86	4.96	3.90
7.	\$3.78	\$5.65	\$8.30	\$8.08	\$4.05	\$5.90
	4	6	7	8	9	6



Multiplying by a Two-Place Number

1. The school store sold 24 boxes of pencils during September. There were 12 pencils in each box. How many pencils were sold in September?

$$\begin{array}{r} 24 \\ \times\ 12 \\ \hline 48 \\ 24 \\ \hline 288 \end{array}$$

First, we multiply by ones. So we multiply 24 by the 2 in 12. The product is 48. Where do we write the 48?

Next, we multiply by tens. So we multiply by the 1 in 12. The product is 24 (tens). We write 4 in ten's place under the 1 that we multiplied by because we are multiplying by 1 ten.

$$\begin{array}{r} 82 \\ \times\ 12 \\ \hline 164 \\ 82 \\ \hline 984 \end{array}$$

2. A pilot flies his airplane about 82 hours a month. How many hours does he fly in a year?

3. The children took 32 boxes of rolls when they went on a picnic. If there were 12 rolls in each box, how many rolls did they take?

4. They also took 12 cases of soda. If there were 12 bottles in each case, how many bottles of soda were there in all?

Copy and multiply:

	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*f*)	(*g*)	(*h*)	(*i*)	(*j*)
5.	82	73	64	81	93	62	51	43	44	11
	× 11	× 13	× 12	× 24	× 33	× 24	× 56	× 33	× 22	× 86
6.	18	48	64	83	92	53	42	11	72	81
	× 11	× 11	× 21	× 33	× 43	× 13	× 23	× 38	× 32	× 45

Multiplying by Tens

1. "How many apple trees do you have?" asked Joe.

"There are 20 rows with 12 trees in each row," said his uncle.

To find how many apple trees there are, we multiply 12 by 20.

There are no ones to multiply by. So we write 0 in one's place in the product. The 0 shows that we are ready to multiply tens. Now when we multiply by 2 (tens), we can start writing our ten's answer in ten's place.

$$\begin{array}{r} 12 \\ \times\ 20 \\ \hline 240 \end{array}$$

2. Tell how these numbers were multiplied:

85	74	63	52	45	38	66	56
10	20	30	40	50	60	70	80
850	1480	1890	2080	2250	2280	4620	4480

Copy and multiply:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
3.	72	67	83	85	77	48	37	98	84
	30	60	50	90	40	70	80	20	10
4.	78	54	68	59	47	98	68	98	76
	50	60	40	70	80	30	20	10	90
5.	38	67	55	26	99	48	88	75	28
	90	70	60	80	40	50	20	80	10

Multiplying with Carrying

1. There are 24 hours in a day. How many hours were in February, 1948? in February, 1950?

When our multiplier is a two-place number, we multiply by the ones first. This product is 216. Then we multiply by the tens. What is the product of 24 multiplied by 20?

We call 216 and 480 **partial products** because each of them is only a part of the product. Now we add the partial products.

In the second partial product, we often do not write the zero in one's place. We must be sure that we start writing our ten's answer in ten's place. We write it directly under the tens we are multiplying by.

```
  24
  29
 216
 480
 696

Check
  29
  24
 116
 58
 696
```

Copy these examples and multiply. Check each answer.

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
2.	35	48	29	39	45	80	77	52	90
	24	63	48	59	75	59	37	69	32
3.	27	53	71	68	38	74	69	88	55
	85	38	49	24	67	42	97	85	64

Study the example in the box. Then copy the examples below and multiply. Check each answer.

```
  275
   25
 1375
 550
 6875
```

	(a)	(b)	(c)	(d)	(e)	(f)
4.	142	184	379	180	406	600
	53	48	26	59	24	16
5.	746	950	742	819	764	816
	61	37	84	90	81	19

Zeros in Multiplication

1. There are seats for 60 people on the big bus. There are seats for how many people on 20 busses?

$$\begin{array}{r} 60 \\ 20 \\ \hline 1200 \end{array}$$

First, we multiply by ones. There are **no ones** in 20. We write 0 in one's place in the product. Then we multiply by tens; so we multiply 60 by the 2 in 20.

$$\begin{array}{r} 260 \\ 30 \\ \hline 7800 \end{array}$$

Study the next example. There is a zero in one's place in both the multiplicand and the multiplier. Do we have any ones to multiply 260 by? What do we write in one's place in the product? Next, we multiply 260 by the 3 (tens) in 30.

$$\begin{array}{r} 106 \\ 20 \\ \hline 2120 \end{array}$$

In the third example we have a zero in ten's place in the multiplicand and a zero in one's place in the multiplier. Study the example and tell how we multiply 106 by 20.

2. Explain how these examples were worked:

80	80	800	64	640	604
7	70	70	4	40	40
560	5600	56,000	256	25,600	24,160

Copy and multiply:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
3.	40	30	60	50	80	70	90	70	50
	80	90	70	70	30	70	80	90	60
4.	650	840	760	840	190	280	390	470	560
	40	30	50	70	60	80	50	60	60
5.	106	308	209	406	505	406	305	408	606
	50	40	50	80	90	70	80	60	90

Shopping

Janet has a problem to work. She has to figure the cost of her grocery bill.

Find the cost:

8 lb. ham at 85¢ a pound
2 lb. butter at 69¢ a pound
4 doz. eggs at 45¢ a dozen

$$\begin{array}{r} \$\ .85 \\ \times\ \ 8 \\ \hline \$6.80 \end{array}$$

Janet said, "First, I find the cost of each item. The cost of the ham is 85¢ multiplied by 8, or $6.80. I find the cost of each of the other items in the same way. Then I add to find the **total** cost, which is $9.98."

$$\begin{array}{r} \$6.80 \\ 1.38 \\ 1.80 \\ \hline \$9.98 \end{array}$$

Work Janet's problem to see if she did her work right. Be sure to check your own work as you find each amount.

Grapes per basket	39¢	Plums per basket	65¢
Hens (dressed) per lb.	43¢	Butter per lb.	80¢
Breakfast Bacon per lb.	56¢	Country Ham per lb.	55¢
Sweet Potatoes per lb.	6¢	Irish Potatoes per lb.	5¢
Eggs per dozen	45¢	Beans (Navy) per lb.	9¢

Finding Costs

At the prices given above, find the cost of these purchases:

1. 4 lb. breakfast bacon
2. 5 doz. eggs
3. 4 baskets grapes
4. 3 lb. dressed hen
5. 2 lb. butter
6. 3 lb. breakfast bacon

7. 2 baskets grapes
8. 4 baskets plums
9. 8 lb. country ham
10. 12 lb. Irish potatoes
11. 6 lb. sweet potatoes
12. 4 lb. navy beans

13. 2 baskets grapes
3 doz. eggs
4 lb. breakfast bacon
12 lb. sweet potatoes

14. 3 lb. navy beans
6 lb. Irish potatoes
6 lb. sweet potatoes
1 doz. eggs

15. 7 lb. country ham
2 lb. butter
3 doz. eggs
1 basket plums

16. 1 basket grapes
1 basket plums
5 lb. dressed hen
12 lb. Irish potatoes

17. 2 doz. eggs
4 lb. dressed hen
2 lb. breakfast bacon
1 lb. butter
3 lb. navy beans

18. 6 lb. country ham
3 lb. breakfast bacon
5 lb. dressed hen
2 lb. butter
4 lb. sweet potatoes

More about Zero

1. Jack's father drives a bus 304 miles each day. How far does he drive the bus in 24 days?

```
  304
   24
 1216

  304
   24
 1216
 608
7296
```

First, multiply by ones. Multiply 304 by 4 in 24. Think: Four 4's are 16. Write 6 in one's place and carry 1 (ten). Think: There are **no tens** in 304 to multiply by 4. But since we had 1 to carry, we write 1 in ten's place. Think: Four 3's are 12 (hundreds). Write 2 in hundred's place and 1 in thousand's place.

Next, multiply by tens. Multiply 304 by 2 in 24. Think: Two 4's are 8. Write 8 in ten's place under the 2 in the multiplier, 24. Think: There are no tens in 304 to multiply by 2; so write 0 in hundred's place. Think: Two 3's are 6. Write 6 in thousand's place.

Add the partial products.

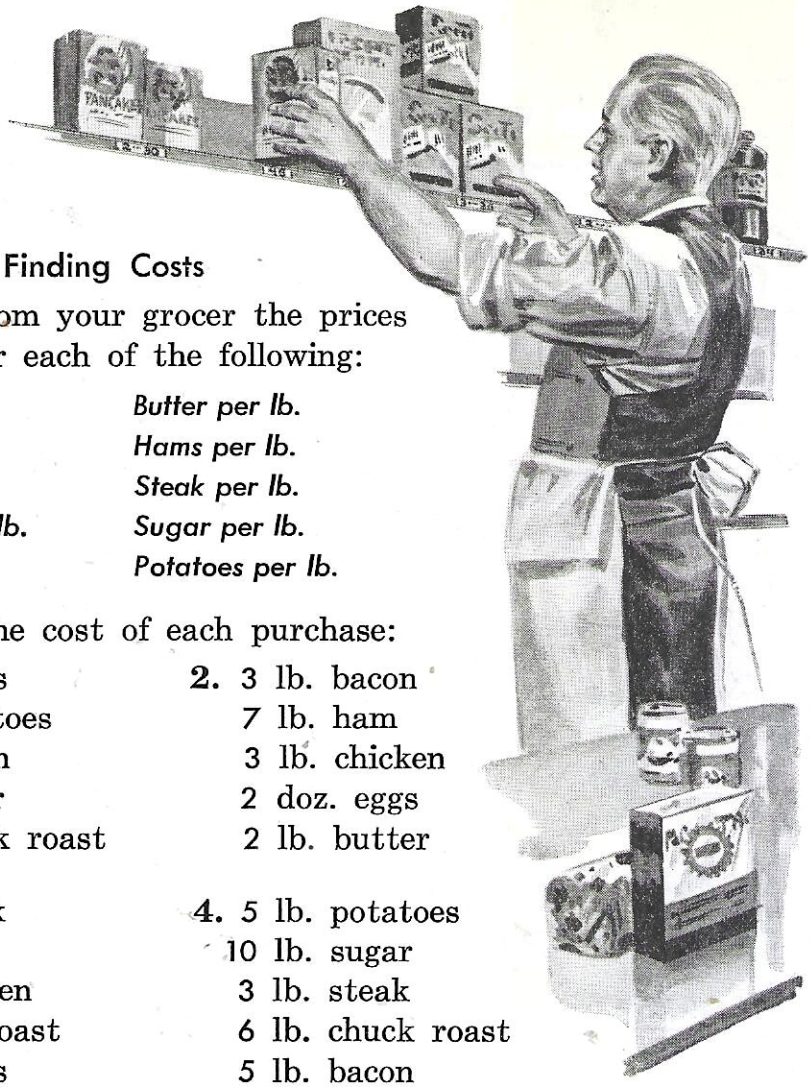
```
$ .14        54
  54       $ .14
  56         216
 70          54
$7.56      $7.56
```

2. Mr. Hanes bought 54 gallons of fuel oil at 14¢ a gallon. How much did the fuel oil cost?

How do we multiply dollars and cents?

Copy and multiply:

	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*f*)	(*g*)
3.	440 62	880 27	209 91	666 48	700 49	290 37	555 65
4.	175 18	396 35	480 67	300 83	509 27	136 39	707 29
5.	$1.26 15	$3.84 26	$5.20 60	$2.08 48	$4.60 48	$8.72 39	$3.80 19



Finding Costs

Find out from your grocer the prices he charges for each of the following:

Eggs per doz.
Chickens per lb.
Bacon per lb.
Chuck roast per lb.
Rib roast per lb.
Butter per lb.
Hams per lb.
Steak per lb.
Sugar per lb.
Potatoes per lb.

Now find the cost of each purchase:

1. 3 doz. eggs
10 lb. potatoes
4 lb. bacon
5 lb. sugar
3 lb. chuck roast

2. 3 lb. bacon
7 lb. ham
3 lb. chicken
2 doz. eggs
2 lb. butter

3. 2 lb. steak
9 lb. ham
5 lb. chicken
6 lb. rib roast
4 doz. eggs

4. 5 lb. potatoes
10 lb. sugar
3 lb. steak
6 lb. chuck roast
5 lb. bacon

5. 2 lb. butter
3 doz. eggs
15 lb. sugar
8 lb. ham
4 lb. bacon

6. 10 lb. potatoes
4 lb. steak
10 lb. sugar
3 doz. eggs
5 lb. chuck roast

Solving Problems

Jack Woods had a problem like this:

Find the cost: 3 lb. butter at 42¢ per lb.
2 doz. eggs at 38¢ per doz.
5 lb. sugar at 6¢ per lb.
2 pk. potatoes at 40¢ per pk.
7 lb. ham at 35¢ per lb.

Amount given clerk: $10.00 *How much change?*

Jack said, "I often had problems like this to solve when I was working in the grocery store last summer.

"First, I find the cost of each item. Thus, 3 pounds of butter at 42 cents a pound cost 42¢ times 3, or $1.26. Next, I find the cost of the other items. Then I add to find the cost of all. The total cost is $5.57.

"Last, I subtract $5.57 from $10.00 to find how much change the customer should get."

$.42
3
$1.26

$1.26
.76
.30
.80
2.45
$5.57

$10.00
5.57
$ 4.43

Work the problem to see if Jack multiplied and added and subtracted correctly.

1. Find the cost of this playground equipment:
10 baseballs at $1.85 each
6 bats at $1.37 each
18 gloves at $1.37 each

2. Find the cost of these toys:
4 express trucks at $1.29 each
3 speed boats at 87¢ each
2 auto transports at $1.89 each

"Of course," said Jack, "I did not find the change by subtracting."

"Did you count it the way our grocer does when he makes change?" asked Ellen.

"Surely," answered Jack. "If a customer owed *57¢* and gave me a dollar, I counted his change like this:

"*57* and 3 are 60, and 10 are *70*, and *5* are *75*, and 25 are a dollar. Or I would just say *57¢*—60, *70*, *75*, and $1.00."

"Suppose a customer owed $5.57 and gave you $10.00. How would you count the change?" asked George.

"Like this," answered Jack. "$5.57 and 3 are $5.60, and 10 are $5.70, and 5 are $5.75, and 25 are $6.00, and 1 are $7.00, and 1 are $8.00, and 1 are $9.00, and 1 are $10.00."

3¢	$.03
10¢	.10
5¢	.05
25¢	.25
43¢	1.00
	1.00
	1.00
	1.00
	$4.43

The amount of change would be $4.43 when counted. If you want to find the amount in working a problem, you can subtract $5.57 from $10.00. You will find that the amount is the same, $4.43.

1. How much change should you get back if you bought $3.65 worth of groceries and gave the clerk $5.00?

2. How much change should you get back from a 10-dollar bill if the total cost of the things you bought was $6.38?

3. How much change should you get back if you bought $9.68 worth of groceries and paid for them with a 10-dollar bill? Count the change.

PRICE LIST

Art Brushes, $1.60 per doz.	Art Gum, 36¢ per doz.
Colored Chalk, 80¢ per box	Pencils, 38¢ per doz.
White Chalk, 37¢ per box	Penholders, 15¢ per doz.
Erasers, $1.75 per doz.	Globes, $4.25 each
Ink Erasers, 40¢ per doz.	Outline Maps, $7.10 each
Pencil Tablets, 54¢ per doz.	Writing Paper, 20¢ per pkg.

Finding Costs

Find the amount of each purchase and the amount of change received.

1. 15 dozen pencils
12 dozen pencil tablets
10 boxes white chalk
4 boxes colored chalk
2 dozen art brushes

Amount given clerk: $30.00
How much change?

2. 2 globes
6 outline maps
3 dozen art gum
4 dozen erasers
20 packages writing paper

Amount given clerk: $80.00
How much change?

3. 30 dozen pencils
12 dozen penholders
2 globes
4 outline maps
25 boxes white chalk
6 boxes colored chalk
10 dozen pencil tablets

Amount given clerk: $80.00
How much change?

4. 2 dozen art brushes
5 boxes colored chalk
24 boxes white chalk
3 dozen erasers
4 dozen ink erasers
24 dozen pencil tablets
36 dozen pencils

Amount given clerk: $60.00
How much change?

Why Do We Divide?

1. Mr. Brown and Ted picked 12 bushels of apples to put in the cellar for winter use. Mr. Brown has 3 big boxes ready for the apples. How many bushels will they put into each box if they put the same number of bushels in each?

Jane said, "We must find how many bushels there are in each of 3 equal groups; so we divide 12 by 3. They will put 4 bushels into each box because there are four 3's in 12."

2. Mr. Brown and Ted picked 12 more bushels of apples. They want to send the same number of bushels to each of 4 persons. How many bushels should they send to each person?

3. Mr. Brown and Ted put the 12 bushels of apples into boxes. Each box held 4 bushels. How many boxes did they fill?

Bill said, "They will fill 3 boxes because there are three 4's in 12."

How Do We Divide?

1. John has 48 rabbits. He made 2 new pens for them. He plans to put the same number of rabbits in each pen. How many should he put in each pen?

$2\overline{)48}$ $\quad\rightarrow\quad 2\overline{)\overset{24}{48}}$

We can use **short division** to work this problem. When we use short division, we write only the answer.

First, we divide the tens. How many 2's are in 4? Write 2 in the quotient above 4.

Next, we divide the ones. How many 2's are in 8? Write 4 in the quotient above 8.

John should put 24 rabbits in each pen.

$$\begin{array}{r} 24 \\ 2\overline{)48} \\ \underline{4} \\ 8 \\ \underline{8} \end{array}$$

2. Helen was given a box of salt-water taffy to share equally with Alice, Jerry, and Susan. There were 124 pieces in the box. Helen found 4 smaller boxes to put the shares in. How many pieces of taffy should she put into each box?

$$\begin{array}{r} 31 \\ 4\overline{)124} \end{array}$$

quotient

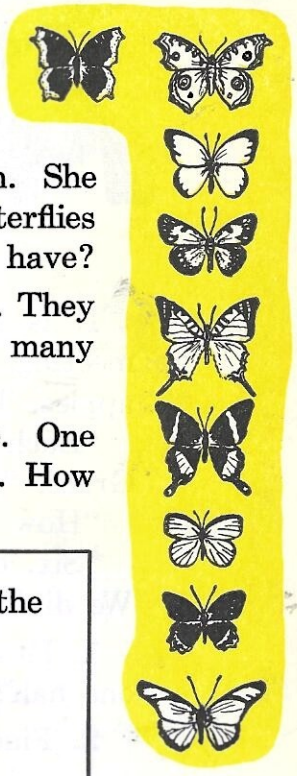
divisor *dividend*

The number we divide is called the **dividend.**
The number we divide by is called the **divisor.**
The answer is called the **quotient.**

Copy and divide:

	(a)	(b)	(c)	(d)	(e)	(f)
3.	$3\overline{)96}$	$4\overline{)1688}$	$5\overline{)455}$	$2\overline{)108}$	$2\overline{)848}$	$3\overline{)1599}$
4.	$6\overline{)246}$	$9\overline{)4599}$	$8\overline{)1688}$	$2\overline{)486}$	$7\overline{)1477}$	$3\overline{)669}$

We Learn about Dividing



1. Jim had 24 pictures of airplanes. He pasted 6 pictures on each page of his scrapbook. How many pages did he use?

2. Ann had 240 butterflies in her collection. She pinned them on a large cardboard. She put 8 butterflies in each row. How many rows of butterflies did she have?

3. Four girls took 2400 Christmas seals to sell. They divided the seals equally among themselves. How many seals did each girl have to sell?

4. The football stadium holds 24,000 people. One sixth of the seats are reserved for the students. How many seats are reserved for the students?

We divide tens, hundreds, and thousands the way we divide ones.

$$\begin{array}{r} 4 \\ 6\overline{)24} \\ \underline{24} \\ 0 \end{array} \qquad \begin{array}{r} 30 \\ 8\overline{)240} \\ \underline{24} \\ 0 \end{array} \qquad \begin{array}{r} 600 \\ 4\overline{)2400} \\ \underline{24} \\ 00 \end{array} \qquad \begin{array}{r} 4000 \\ 6\overline{)24000} \\ \underline{24} \\ 000 \end{array}$$

Copy and divide:

	(a)	(b)	(c)	(d)	(e)	(f)
5.	$8\overline{)320}$	$9\overline{)810}$	$8\overline{)720}$	$7\overline{)630}$	$9\overline{)540}$	$6\overline{)420}$
6.	$9\overline{)4500}$	$5\overline{)3000}$	$7\overline{)4900}$	$9\overline{)2700}$	$8\overline{)3200}$	$7\overline{)5600}$
7.	$8\overline{)64000}$	$9\overline{)18000}$	$5\overline{)15000}$	$6\overline{)36000}$	$8\overline{)40000}$	$9\overline{)54000}$

Sharing

It is Betty's turn to take taffy apples to the club meeting. There are 18 members; so Betty needs 18 taffy apples. Two of her friends will help her make them.

"Each of us should make the same number," suggested Grace. "Each of us should make one third of them."

"How many should I make?" asked Sue.

"Six, of course," said Grace. "One third of 18 is 6. We divide 18 by 3 to find one third of it."

1. How do we find one fifth of a number of things? one half? one eighth? one fourth?

2. Find these parts of numbers:

$\frac{1}{2}$ of 24	$\frac{1}{3}$ of 96	$\frac{1}{8}$ of 72	$\frac{1}{6}$ of 54	$\frac{1}{7}$ of 49
$\frac{1}{4}$ of 204	$\frac{1}{5}$ of 255	$\frac{1}{9}$ of 270	$\frac{1}{2}$ of 126	$\frac{1}{3}$ of 276

3. Mrs. Cotten offered to take 240 cookies to the bake sale. Jane asked if she might make half of them. How many cookies should Jane make?

4. Ann has 186 bird pictures to share. If she gives one half of them away, how many pictures will she keep?

Dividing Dollars and Cents

1. How much should Harry's father pay each month if he buys a \$48 radio and pays for it in 6 equal payments?

$$6\overline{)\$48} = \$8, \quad 48$$

2. Mr. Dent bought a radio for \$48 and paid for it at the rate of \$8 a month. In how many months did he have the radio paid for?

$$\$8\overline{)\$48} = 6, \quad 48$$

3. The nine members of the Good Cheer Club decided that \$2.70 would be enough to spend for food to fill a Thanksgiving basket for a needy family. Each will give the same amount. How much will each give?

$$9\overline{)\$2.70} = \$.30, \quad 27, \quad 0$$

4. The pupils in our room paid \$1.68 for milk today. If the pupils paid 8¢ for each bottle of milk, how many bottles of milk did they buy?

How do we divide cents by cents?
We think of \$1.68 as 168 cents.
Then we divide 168 by 8.

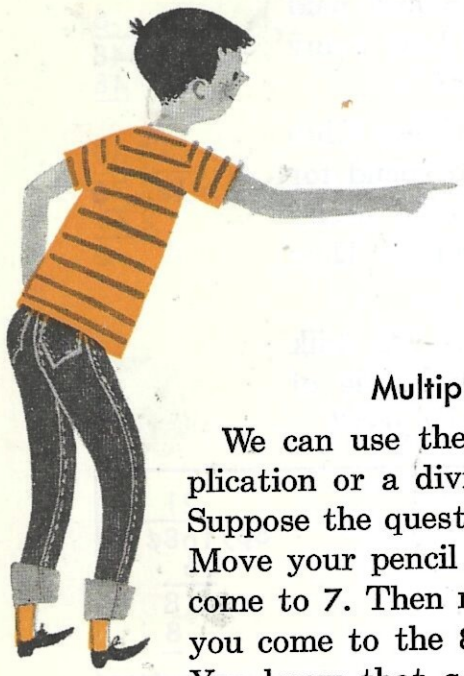
$$8¢\overline{)168¢} = 21, \quad 16, \quad 8, \quad 8$$

5. Eight of us will buy Grandmother a \$16.80 present and share the cost equally. What will each of us pay?

$$8\overline{)\$16.80} = \$2.10, \quad 16, \quad 8, \quad 8, \quad 0$$

6. At a sale Mrs. Rich paid \$3.50 for 5 pairs of socks for Jim. How much did she pay for each pair if they cost the same amount?

7. Ann had \$3.60 to buy 6 dozen oranges for a school picnic. What price per dozen can she pay for the oranges?



	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

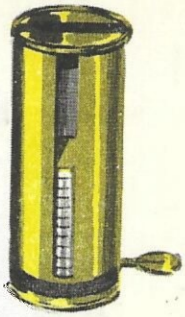
Multiplication and Division Table

We can use the table to find the answer to a multiplication or a division question that we cannot answer. Suppose the question is: **Seven eights are how many?** Move your pencil down the column at the left until you come to 7. Then move your pencil along the 7 row until you come to the 8 column. At that point is the answer. You know that **seven eights are fifty-six.**

Suppose the question is: **How many 8's in 56?** Move your pencil down the column at the left until you come to 8. Then move your pencil along the 8 row until you come to 56. Now look at the top row of figures and see in which column 56 is. You know that there are **seven eights in fifty-six.**

For practice find these answers:

$$\begin{array}{rrrrr} 8 & 7 & 9 & 8 & 9 \\ \times 8 & \times 8 & \times 4 & \times 9 & \times 7 \\ \hline \end{array} \qquad 9\overline{)63} \qquad 7\overline{)56} \qquad 8\overline{)72} \qquad 9\overline{)54}$$



Using the Table for Dividing

Pauline has saved 38 pennies. She is going to take them to the bank and exchange them for nickels to put in her nickel saver. How many nickels should she get for her pennies?

The question is: **How many 5's are in 38?**

Of course, you know, but suppose that Pauline does not know. She can run her pencil down the column at the left until she comes to 5. Then she can move her pencil along the 5 row until she comes to 38. But there is no 38 in the 5 row; so Pauline stops at the number in the 5 row that is nearest 38, but less than 38. That number is 35. Now she can see that 35 is in column 7.

Pauline should get 7 nickels and have 3 pennies left over.

$$5\overline{)38}\quad 7,\ 35,\ 3$$

Find the answers and remainders:

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
1.	$6\overline{)38}$	$7\overline{)45}$	$7\overline{)50}$	$8\overline{)60}$	$9\overline{)70}$	$6\overline{)56}$	$5\overline{)47}$	$9\overline{)44}$
2.	$9\overline{)48}$	$6\overline{)50}$	$8\overline{)47}$	$9\overline{)65}$	$7\overline{)60}$	$6\overline{)45}$	$7\overline{)36}$	$6\overline{)25}$
3.	$7\overline{)52}$	$6\overline{)28}$	$7\overline{)62}$	$7\overline{)40}$	$7\overline{)20}$	$8\overline{)36}$	$9\overline{)42}$	$8\overline{)62}$
4.	$8\overline{)45}$	$9\overline{)58}$	$8\overline{)54}$	$9\overline{)60}$	$5\overline{)39}$	$4\overline{)37}$	$8\overline{)70}$	$9\overline{)67}$
5.	$8\overline{)65}$	$9\overline{)75}$	$8\overline{)75}$	$9\overline{)80}$	$8\overline{)68}$	$9\overline{)78}$	$6\overline{)59}$	$7\overline{)59}$

Remainders in Dividing

The fifth-grade class is having a picnic in the city park. There are 23 girls and 25 boys.

1. "We girls want to run a relay race. We will choose two teams with the same number of players on each team. If there is an extra person, she can be the starter," said Mary.

How many girls can be on each team?

$$\begin{array}{r} 11 \\ 2\overline{)23} \\ \underline{2} \\ 3 \\ \underline{2} \\ 1 \end{array}$$ *remainder*

There will be 11 girls on each team with 1 left over for starter.

2. The 25 boys want to choose 3 teams for a relay race. They also must have the same number on each team. How many boys can be on each team? Will there be an extra boy?

Oral Practice in Uneven Division

1. Say all the numbers that are useful products when you divide by 6; by 7; by 8; by 9.

2. What useful product is next smaller than each of these numbers when you divide by 6?

7 16 25 11 35 41 56 49 27 51

3. What useful product is next smaller than each of these numbers when you divide by 9?

42 28 16 35 48 21 64 56 24 15

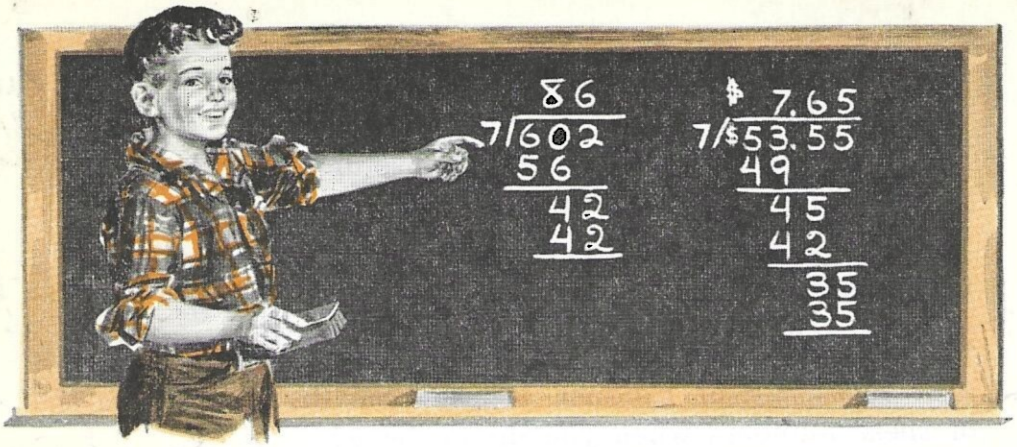
4. Say the quotient and remainder when you divide each number below by 7 and then by 8.

$$\begin{array}{r} 7 \\ 7\overline{)50} \\ \underline{49} \\ 1 \end{array}$$ *remainder*

15 25 29 34 41 58 60 69

5. Divide the numbers in columns *a* and *b* by 2. Divide the numbers in columns *a*, *b*, and *c* by 3, and so on. Last, divide each number by 9.

a	*b*	*c*	*d*	*e*	*f*	*g*	*h*
10	23	36	41	59	67	78	84
13	26	31	45	50	64	72	89
12	29	35	48	56	68	71	87
18	20	39	43	54	65	77	86
19	25	30	47	55	61	79	83
16	27	38	44	51	62	70	80
14	21	34	40	53	66	76	82
17	24	32	42	58	63	75	81
11	28	37	49	52	60	73	85
15	22	33	46	57	69	74	88



Steps in Division

This is the way Kenneth divides 602 by 7.

He thinks, "Any sevens in 6? No. Any 7's in 60? Yes." He knows where to start writing his answer. He writes the first figure in the quotient in ten's place above 0.

He **divides**: Sevens in 60, 8. He writes 8 in ten's place in the quotient.

He **multiplies**: Eight 7's are 56. He writes 56 under 60, and he notices that 56 is not larger than the 60 above it.

He **subtracts** 56 from 60, and writes 4. He notices that the remainder 4 is less than the divisor 7.

He **brings down** the 2 and writes it beside the 4.

He **divides** 42 by 7: Sevens in 42, 6. He writes 6 in one's place in the quotient.

He **multiplies**: Six 7's are 42. He writes 42 under 42 and notices that he has finished the division.

He has divided both the tens and the ones. First, he divided the 60 tens. Then he divided the 42 ones. His answer is 8 tens and 6 ones, or 86.

Explain how we divide $53.55 by 7.

Division with Carrying

1. Susan bought 6 little chickens for 96 cents. How much did she pay for each?

First, divide the tens. How many 6's in 9? Write 1 in ten's place above the 9. Multiply, subtract, and bring down. Next, divide the ones. How many 6's in 36? Write 6 in one's place.

Susan paid 16¢ for each little chicken.

$$\begin{array}{r} 16¢ \\ 6\overline{)96¢} \\ \underline{6} \\ 36 \\ \underline{36} \end{array}$$

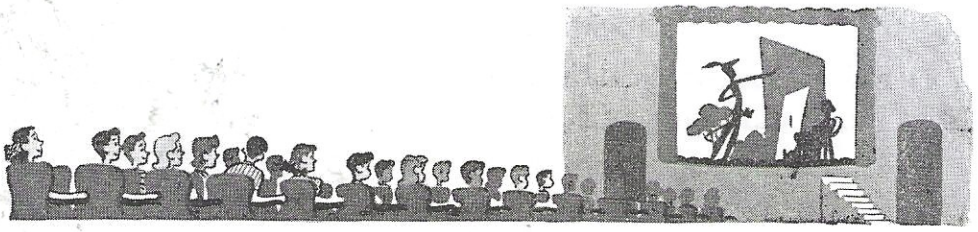
2. After keeping the chickens for two months, she sold the 6 chickens for $2.70. How much was she paid for each?

$$\begin{array}{r} \$.45 \\ 6\overline{)\$2.70} \\ \underline{24} \\ 30 \\ \underline{30} \end{array}$$

3. Susan bought 8 yards of chicken wire to build a fence around her chicken yard. She had to pay $1.44 for the wire. How much was the cost of the wire per yard?

4. During the 8 weeks that Susan kept her little chickens, she spent $1.20 for feed. How much did the chicken feed cost her each week?

$$8\overline{)\$1.20}$$



Zero in the Quotient

1. The fifth-grade class is giving a show in the school auditorium. They have invited the rest of the school to the show. There are 424 pupils in the other grades, but they cannot all see the show at one time. The auditorium will seat about one fourth of them at a time. How many may see the show at a time?

$$\begin{array}{r} 1 \\ 4\overline{)424} \\ \underline{4} \end{array}$$

Where shall we write the first figure of our quotient? How many 4's in 4? Write 1 in hundred's place in the quotient. Multiply 4 by 1 and write 4 under 4. Subtract. What is left when you subtract 4 from 4? Bring down the 2.

$$\begin{array}{r} 10 \\ 4\overline{)424} \\ \underline{4} \\ 2 \end{array}$$

Now divide the tens. Are there any 4's in 2? No, but we must write 0 in ten's place in the quotient. Why? Bring down the 4.

$$\begin{array}{r} 106 \\ 4\overline{)424} \\ \underline{4} \\ 24 \\ \underline{24} \end{array}$$

Now divide the ones and write the answer in one's place.

106 pupils may see the show at a time.

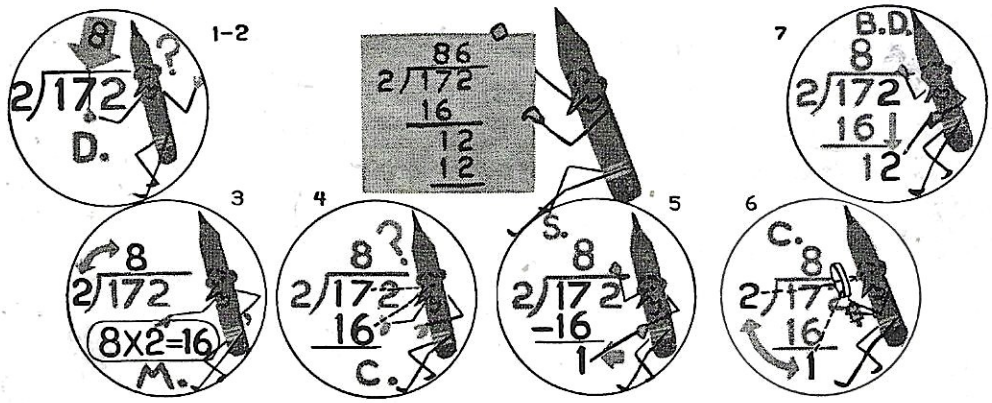
Copy and divide:

	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)	(*f*)
2.	$6\overline{)630}$	$4\overline{)832}$	$3\overline{)918}$	$7\overline{)742}$	$8\overline{)1648}$	$9\overline{)1872}$
3.	$5\overline{)1525}$	$6\overline{)1842}$	$8\overline{)8336}$	$9\overline{)9495}$	$7\overline{)7574}$	$4\overline{)8232}$
4.	$6\overline{)7842}$	$2\overline{)8130}$	$5\overline{)5430}$	$8\overline{)9664}$	$6\overline{)6252}$	$7\overline{)7567}$

Reviewing Division

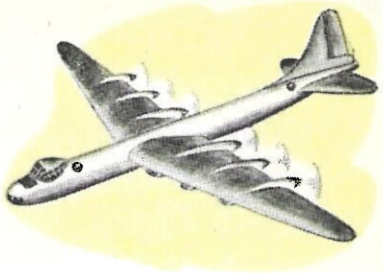
Steps to remember:

1. Decide where to write the first quotient figure.
2. Divide.
3. Multiply.
4. Compare the product with the partial dividend.
5. Subtract.
6. Compare the remainder with the divisor.
7. Bring down.
8. Proceed as before, beginning with Step 2.



	Test		*Practice*		
	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)
1.	2)172	4)420	6)318	8)376	3)234
2.	9)567	2)1568	4)1824	6)4314	8)4232
3.	5)2745	7)6678	9)5625	5)435	3)2541
4.	5)$2.35	6)$5.04	7)$4.62	8)$6.08	9)$3.42
5.	4)$15.04	6)$34.02	8)$24.32	3)$15.12	5)$45.75
6.	7)$52.92	9)$52.74	5)$10.70	6)$36.30	8)$16.64

Chapter 3
Reading and Solving Problems



The boys brought 24 fighters and 8 bombers for their airplane show at the Boy Scout hut. How many airplanes did they bring altogether?

To solve the problem:

1. We read the problem carefully and thoughtfully to get an idea of what it is about.

The General Idea: *The boys are having an airplane show. They brought their airplanes to it.*

2. Next we give our attention to the question.

a. What is the question?

The Question: *How many airplanes did they bring?*

b. How do we answer the question?

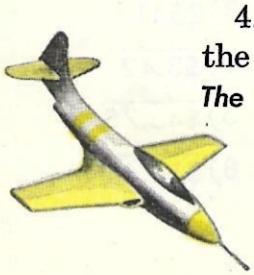
The Thinking: We think the airplanes together.

c. What process do we use?

The Process: Thinking together is addition.

3. We get ready to answer the question. We read the problem again to find the number facts that it tells.

The Facts: *The boys brought 24 fighters and 8 bombers.*



4. Now we solve the problem. We find the answer to the question. We use the facts to answer the question.

The Solution:

$$\begin{array}{r} 24 \\ 8 \\ \hline 32 \end{array}$$

The Answer: 32 airplanes

The boys brought 32 airplanes.

The boys brought 24 fighters and 8 bombers for their airplane show at the Boy Scout hut. How many more fighters than bombers did they bring?

This problem gives us the same facts as the problem on page 64, but to answer the two questions, we use different processes. The question on page 64 makes that problem a "put-together" problem. The question above makes this problem a "compare" problem. To solve the first problem, we add. To solve the problem above, we subtract.

The boys brought 24 fighters and 8 bombers for their airplane show at the Boy Scout hut. How many times as many fighters as bombers did they bring?

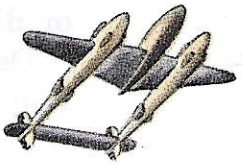
What process must we use to answer the question?

Read the problem. Tell what process we use to answer the question. Solve the problem.

1. The boys planned to have 40 airplanes in the show. Only 32 airplanes were brought in. How many more airplanes had they planned to have in the show?

2. There are 32 airplanes in the show. One eighth of them belong to Tom. How many airplanes are Tom's?

3. There are 32 airplanes in the show. Eight of them are bombers, and the others are fighters. How many fighters are there?



Reading and Solving Problems

Every day each of us has a few problems to solve. Some of them are in our arithmetic work. Some are in our other school work. Many more are in the things we do outside of school.

When we have a problem to solve, we have a question to answer. We decide what we must do to answer the question. There are only four things that we can do: add, subtract, multiply, or divide. We call addition, subtraction, multiplication, and division the **processes**.

The problem tells us two or more facts. From them we get the numbers that we add, subtract, multiply, or divide.

Jane had $1.25. She spent 50¢ at the store. How much money did she have left?

First, we read the problem carefully and think about it so that we know what it means. What is the problem about? What happens in the problem?

Jane had some money. She spent part of it.

Next, we find the facts that the problem tells.

Jane had $1.25. She spent 50¢.

We read the question again:

How much money did she have left?

Then we decide what we must do with the facts to answer the question. Do we add, subtract, multiply, or divide?

Does the answer that we get really answer the question that the problem asks?

Why Do We Subtract?

When something happens to leave fewer or less than there were at first, we subtract to find how many are left.

Why do we subtract to answer these questions?

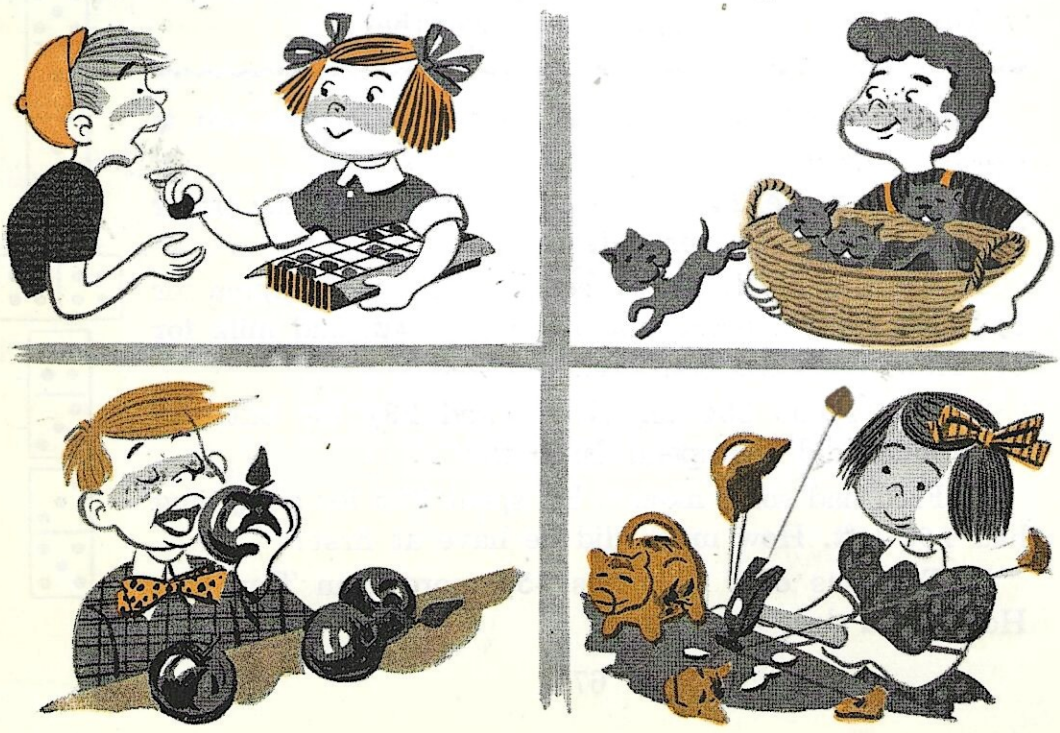
1. Jack has saved $1.50. He buys a book of puzzles for 35¢. How much money has he left?

2. Joe had 120 chickens before he sold 36 of them. Then how many chickens did he have?

3. Mary bought a book for 72¢. She gave the clerk a dollar. How much change should she get?

We subtract to find how many are left when we take some away from a group.

Look at each picture. What happens? Tell why the picture shows taking away or subtracting.



Why Do We Add?

When something happens in a problem to give us more than we had at first, we add to find how many we have.

Jack had 75¢. His father gave him 50¢ for his birthday. How much did Jack have then?

Tom had 25 Savings Stamps. He bought 15 more. How many Savings Stamps did he have then?

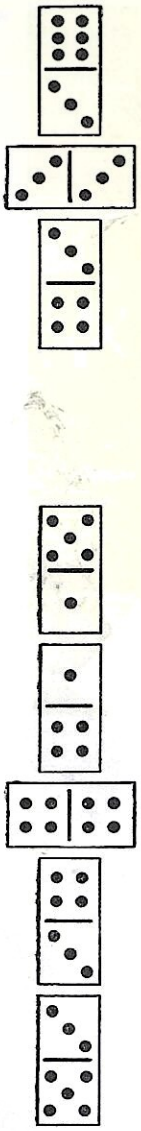
We add when we have two or more groups that are alike and want to find how many there are in all.

Jim brought 6 watermelons for the party, and John brought 4. How many did both boys bring?

Jane saw 6 robins, 6 blue jays, and 8 wrens. How many birds did she see altogether?

Altogether, both, and more help us to see that we add to answer the questions.

1. Mary made 24 red paper hats and 38 blue paper hats. How many paper hats did she make?
2. Jim ate his lunch at school. He got an apple for 5¢, soup for 8¢, bread and butter for 4¢, and milk for 6¢. How much did his lunch cost?
3. Jane spent 80¢ for ribbon and 28¢ for buttons. How much did she spend for both?
4. Fred had some money. He spent 75¢ for a cap and had 25¢ left. How much did he have at first?
5. Tom has 65¢. Jane has 45¢ more than Tom has. How much does Jane have?



Why Do We Subtract?

When something happens to leave fewer or less than there were at first, we subtract to find how many are left.

Why do we subtract to answer these questions?

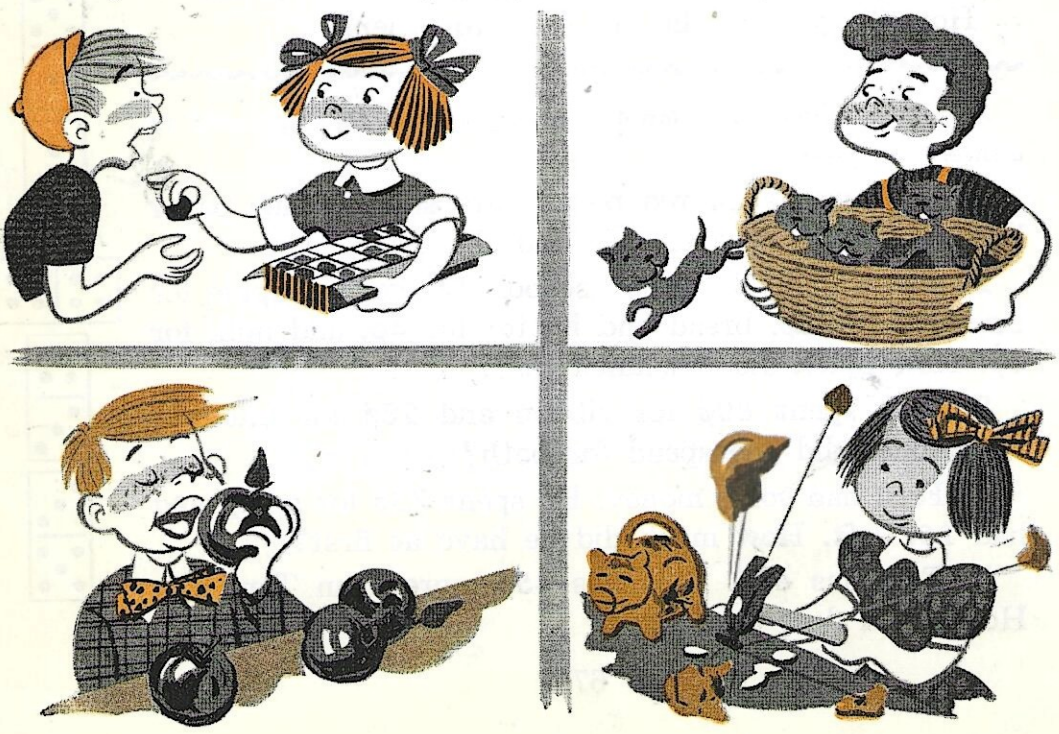
1. Jack has saved $1.50. He buys a book of puzzles for 35¢. How much money has he left?

2. Joe had 120 chickens before he sold 36 of them. Then how many chickens did he have?

3. Mary bought a book for 72¢. She gave the clerk a dollar. How much change should she get?

We subtract to find how many are left when we take some away from a group.

Look at each picture. What happens? Tell why the picture shows taking away or subtracting.



Why Do We Subtract?

We subtract when we have two groups and want to find how many more or how many fewer there are in one group than in the other.

Why do we subtract to answer these questions?

1. Alice colored 36 Easter eggs, and Jane colored 24. How many more eggs did Alice color than Jane?

2. Jim has 30¢, and Jack has $1.00. How much more money does Jack have than Jim?

3. Jim is 65 inches tall, and Jane is 56 inches tall. How much taller is Jim than Jane?

4. Alice is 10 years old, and her mother is 35 years old. How much younger is Alice than her mother?

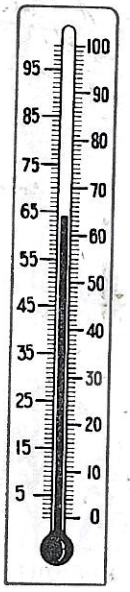
5. Jack went with his father on a trip. They drove 98 miles in the morning and 164 miles in the afternoon. How much farther did they drive in the afternoon than in the morning?

6. Jim weighs 68 pounds, and his father weighs 175 pounds. Jim's father is how much heavier than Jim?

7. Ted wants to buy a horn for his bicycle. He saw two horns. One cost 90¢, and the other cost 75¢. What is the difference in the cost of the horns?

8. Jack spent $1.15 for his baseball cap, and Jim spent 90¢ for his. How much more did Jack's cap cost than Jim's?

When we compare numbers to find how much more or how much less one is than the other, we subtract to find the difference. We subtract to find the difference in size, amount, price, cost, length, height, or weight.



More about Comparing

We subtract to find how many more we need when we know how many we want and how many we have.

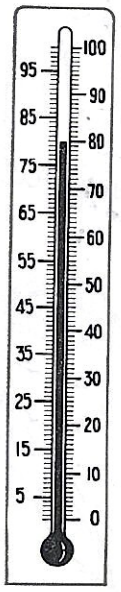
Tell why we subtract to answer these questions:

1. Bill wants to buy a baseball bat that costs a dollar. He has 80¢. How much more money does he need?

2. Betty wants to color 60 Easter eggs. She has already colored 15 eggs. How many eggs does she still need to color?

3. When Helen bought her book, she gave the clerk a dollar, and he gave her 25¢ change. How much did the book cost?

4. Early this morning the thermometer read 64°. This afternoon it read 80°. How much warmer was it in the afternoon than in the morning?



We subtract to find how many are gone when we know how many there were in all and how many there are now.

5. Tom had 100 marbles in a bag. He dropped the bag and spilled the marbles in the tall grass. He found 85 marbles. How many marbles did he lose?

6. Jim's father had 64 sheep in the pasture. When Jim counted them, there were only 60. How many sheep were gone?

When we know how many there are in a whole group and how many of one kind there are, we subtract to find how many of the other kind there are.

7. Jim's father has 64 sheep. Eight of them are black, and the others are white. How many white sheep does he have?

Why Do We Multiply?

We multiply when we have several equal groups and want to know how many there are altogether.

1. Three boys **each** brought 4 watermelons to the party. How many watermelons did they bring?

We multiply when we know the cost of one article and want to find the cost of several of them.

2. Eggs are selling at 36¢ a dozen. How much will four dozen eggs cost?

Tell why we multiply to answer these questions:

3. Each page of Tom's stamp book holds 48 stamps. He has 8 full pages. How many stamps are in the book?

4. There are 9 rows of chairs in our room, and there are 12 chairs in each row. How many chairs are in our room?

5. Five children paid 80¢ **apiece** to buy a picture for their room. How much did the picture cost?

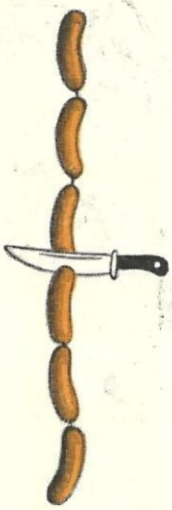
6. Our car can travel 18 miles on 1 gallon of gas. At that rate how far can it go on 8 gallons? At that rate how far can it go on 12 gallons?

7. One ticket to the show costs 44¢. How much will five tickets cost?

8. At 6 miles an hour, how far can you ride your bicycle in 4 hours?

9. There are 9 players on **every** baseball team. How many are there on 2 teams?

10. Bill delivers 84 papers every week. How many papers will he deliver in 4 weeks? How many will he deliver in 6 weeks?



Why Do We Divide?

We divide when we separate a number of things into equal groups and find how many there are in one of the equal groups.

1. Mary has 160 stamps to paste in her stamp book. She plans to put the same number of stamps on **each** page, and there are 8 pages in her book. How many stamps should she put on each page?

We divide when we separate a number of things into equal groups and find how many groups there are.

2. Betty made 12 cupcakes. She wants to put 2 cakes on each plate. How many plates will she need?

We divide when we share equally a number of things and find how many each person gets.

3. Mrs. Hall gave Betty and Sue 100 pennies to divide equally between them. How many pennies will each girl get?

We divide when we cut something into equal pieces and find the size of each piece.

4. Jane has a ribbon that is 12 feet long. She wants to give half of it to Betty. How long will each piece of ribbon be?

When we know the total cost of several things that are alike, we divide to find the cost of one of them.

5. Jane paid $1.50 in all for 3 books. If the books were the same price, how much did one book cost?

Why do we divide to answer this question?

6. The price of a pair of skates is $4.50. Joe can save 50¢ a week. In how many weeks can he save enough to pay for the skates?

Without Pencils

Read each problem carefully. Decide which of the four processes—addition, subtraction, multiplication, or division—you will use to find the answer to the question that is asked. Then find the answer without using your pencil and paper.

1. Tom had 60¢. He earned 25¢ picking some cherries for Mrs. Brown. Then how much money did he have?

2. Jane bought 3 ten-cent notebooks. How much did the notebooks cost altogether?

3. Jack had $2.00. He bought a fishing pole for 50¢. How much money did he have left?

4. Bill has 70¢, and Tom has 85¢. Which boy has more money? How much more?

5. Eggs are 40¢ a dozen. How much should Mrs. Hall pay for a half dozen?

6. Betty wants to make 5 scrapbooks for the boys and girls at the hospital. She needs 12 sheets of paper for each scrapbook. How many sheets of paper should she get?

7. The girls helped Betty get pictures for the books. They now have 60 pictures. If Betty puts 3 pictures on each page, she has enough pictures for how many pages?

8. Alice wants to put 9 buttons on her new dress. She has already put 6 buttons on it. How many more buttons does she have to put on the dress?

9. How many 5-cent pencils can Jane buy with a quarter? How many pencils can Jack buy with a quarter and a dime?

How much?

Estimating Answers

After you read a problem and decide what process you should use to answer the question, it is a good idea to **estimate** what your answer should be. It will help you to know that your answer is **reasonable.**

1. A ticket to the movies costs 52 cents. How much should Mr. Hays pay for 4 tickets?

Estimate

$ .50
×4
$2.00

Think: 52¢ is a little more than 50¢. If 1 ticket costs 50¢, 4 tickets will cost $2. Mr. Hays should pay a little more than $2 for the 4 tickets.

Now find the **exact** answer. Is it about the same as your estimate?

Exact answer

$ .52
×4
$2.08

Estimate the answer to each problem. Then find the exact answer. Is your answer reasonable?

2. Mrs. White needs 3 loaves of bread that cost 16¢ a loaf. How much should she pay for the bread?

3. Mr. White delivers 48 quarts of milk each day. How many quarts does he deliver in a week?

4. At 18¢ a quart, how much does Mr. White get for the 48 quarts of milk he delivers each day?

5. It takes 12 sheets of paper to make a notebook for science. How many notebooks can be made from a package of paper that has 500 sheets in it?

6. Jim needs a sack of feed for his chickens. It will cost $2.95. He has a five-dollar bill. Does he have enough money also to buy a feed trough that costs $1.40?

7. Mr. Howard averaged 39 miles per hour. How far did he drive his car in 5 hours?

Extra Numbers in Problems

Some of these problems give facts that are not needed to answer the question. They are **unimportant**. Do not let them catch you! Decide which facts are **important** and pay no attention to the others.

Read each problem. Then make a list of all the facts in that problem. Cross out the unimportant facts. Remember, we use the important facts to solve the problem.

1. At the store Jack found a hammer marked \$1.25 and a saw marked \$2.19. He bought the saw and paid for it with a five-dollar bill. How much money did he have left after he paid for the saw?

~~*a.* The hammer costs \$1.25.~~

Think: Jack did not buy the hammer.

b. The saw costs \$2.19.

c. Jack paid for the saw with a five-dollar bill.

2. Mary promised to make 8 meat and 10 cheese sandwiches for the picnic. Jane promised to make 6 of each kind. How many meat sandwiches did the girls make?

3. Mr. Bell ordered some bushes to plant in his yard. There were 3 lilacs, 2 butterfly bushes, 6 white rosebushes, 3 red rosebushes, and 4 yellow rosebushes. How many rosebushes did he order?

4. Bill wants some string for his kite. He saw some balls of string at the store that had 80 yards of string on them. They cost 69¢ a ball. How much should he pay for 2 balls of string?

5. In our room 33 of the 36 children bought tickets to the circus. Each ticket cost 15¢. How much did the children spend for circus tickets?

Can You Tell?

1. Jack, George, John, and Henry were talking about how much money they had spent for Savings Stamps.

If you know how much each spent, how can you find how much all the boys spent?

2. Perry knows how many minutes it takes to pull the weeds in one row of potatoes, and he knows how many rows he has.

Can he tell how long it will take him to pull the weeds in all the rows? How?

3. Ellen knows the number of yards of ribbon that she wants to buy and the cost of each yard.

How can she find how much all the ribbon will cost?

4. Ida knows how much money she can spend for party favors and the number of favors she needs.

Can she tell how much she can spend for each? How?

5. The conductor told Joe the number of miles the train traveled each hour. Joe knows how many hours he has been on the train.

How can he tell how far he has traveled?

6. Tom and Jim were counting their marbles.

"I have 14 more than you," said Tom.

How could he know that?

7. Jim said, "I have $6.00, but I need $12.75 more to buy an E Bond." What is the price of an E Bond?

8. If Jack does not cash his $18.75 Bond for 10 years, he will get $25 for it. How much will he make on the Bond?

Helps in Solving Problems

These questions will help you to understand problems:

1. What are the four processes?

2. When we put groups together, we use one of two processes. What are the two processes?

3. When we put two or more equal groups together, do we multiply or add?

4. When we take some away from a group, do we add or subtract?

addition
subtraction
multiplication
division

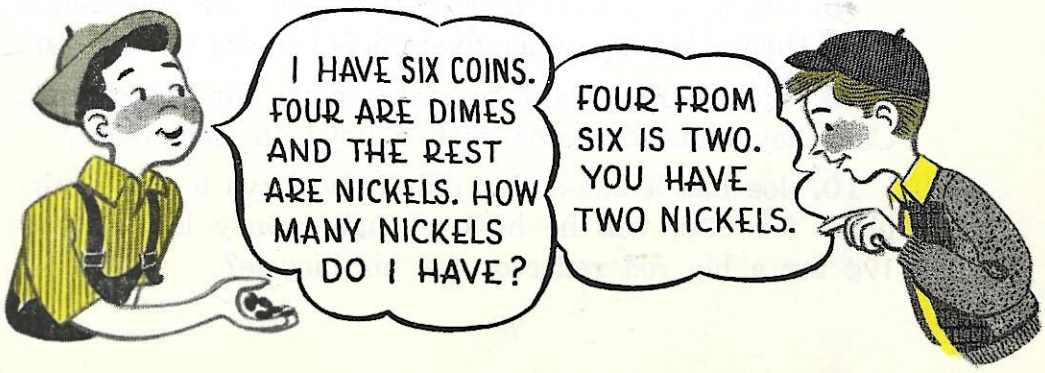
5. When we separate a group into equal groups, what do we do to find how many are in each group?

6. When we know how many are in each of two groups, how do we find how many more are in one group than are in the other? How do we find how many fewer are in one group than are in the other?

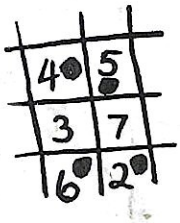
7. When we know how many we want and how many we have, how do we find how many more we need?

8. When we know how many are in each of two groups, how do we find the difference?

9. When we know how many there are in all and how many there are of a certain kind, how do we find how many there are of the other kind?



Find the score

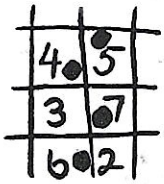


No Pencils

Read each problem carefully. Tell what process you use to answer the question. Why do you use that process? Give the answer to each problem without writing anything.

1. Jane promised to take 24 cupcakes to the picnic. She has already made 12 of them. How many more does she need to make?

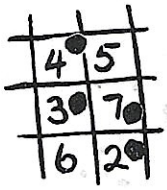
2. John is 12 years old. He is three times as old as his little sister Nancy. How old is Nancy?



3. Bill has 72 marbles. He says that $\frac{1}{9}$ of them are agates. How many agates has he?

4. Little pumpkin pies cost 15¢ each. How much will Mrs. Winters have to pay for 6 of the pies?

5. Every Saturday from May until frost Grace takes flowers to sick people in town. One day she picked 8 asters for one bunch, 10 asters for another bunch, and 7 asters for a third bunch. How many asters did she pick that day?



6. Mrs. Allen bought 2 dozen eggs at 35¢ a dozen. How much did she pay for the eggs?

7. Jim has 75¢. How many 3-cent stamps can he buy?

8. Mary has 36 handkerchiefs to iron. She has ironed 24 of them. How many handkerchiefs has she yet to iron?

9. Thirty boys want to make teams for tug of war. Can they make 5 teams with 6 boys on each team?

10. Joe has a one-dollar bill. If he buys a model airplane for 80¢, will he have enough money left to pay 19¢ for a big red reflector for his bicycle?

Can You Finish the Problem?

The pupils in Grade 5 of the Highlawn School are testing each other to see how well they can tell what questions are asked in problems.

Each pupil tells part of a problem, and the "game" is for another pupil to tell the rest.

See if you can finish their problems.

Jane's: Last Saturday Mother bought a dress and a pair of shoes for me. They cost $7.68. Mother gave the clerk a $10-bill.

George's: I want to save my money so that I can buy a bicycle that costs $27.50. I have saved $18.79.

Henry's: Last summer Father and I set out 36 rows of tomato plants. In each row we had 48 plants.

Susan's: Last year Mother had to buy 4 pairs of shoes for me. Altogether, she paid $19.40 for the shoes.

Ruthie's: I had $15.75 saved, but I had to spend $3.50 for a pair of shoes and $2.48 for a sweater.

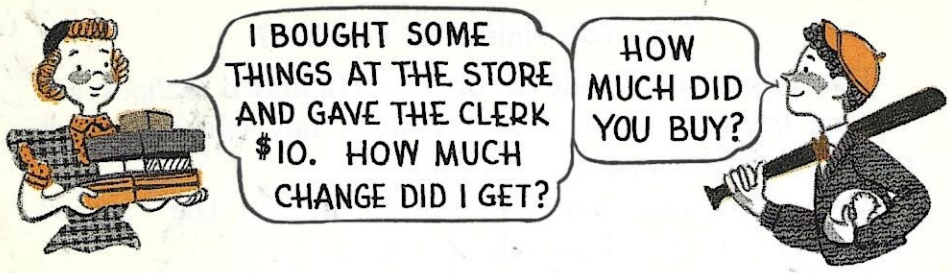
Jack's: At our camp last summer there were 26 boys. The expenses for each boy were $7.65.

Jim's: I bought an E Bond for $37.50. At the end of 10 years it will be worth $50.

Mary's: There are 52 weeks in a year. I saved 25¢ each week last year.

Joe's: I bought 7 ten-cent Savings Stamps for Jane and 5 for myself.

Solve each problem by answering the question that you asked.



What Else Should Be Told?

1. Laura purchased some goods at the department store. She gave the clerk a $10-bill. How much change should she have received?

2. Last summer Gordon West set out 8 rows of tomato plants. How many plants did Gordon set out altogether?

3. Robert Smith sold the corn he raised for $1.60 a bushel. How much did he receive for all the corn he sold?

4. Jack missed 3 words in his spelling test. How many words did he spell correctly?

5. Ruth Benton bought some ribbon for $1.25. How much did it cost a yard?

6. Ruth's father went on a business trip to Chicago by airplane. The average speed of the airplane was 200 miles an hour. How far away is Chicago?

7. Mr. Benton drove to Washington, D.C., in 7 hours. How far away is Washington?

8. John's uncle gave him a present of $5.00 on his birthday. How much money does John now have altogether?

9. Gordon bought 3 shirts. How much did he pay for them?

Our Science Collections

The pupils in the science class are making their fall collections. See if you can answer the questions to their problems **without your pencil.**

1. Jane pasted her seeds on a big piece of cardboard. She has seeds of 10 vegetables, 8 fall flowers, and 7 nuts. Of how many different plants has she the seeds?

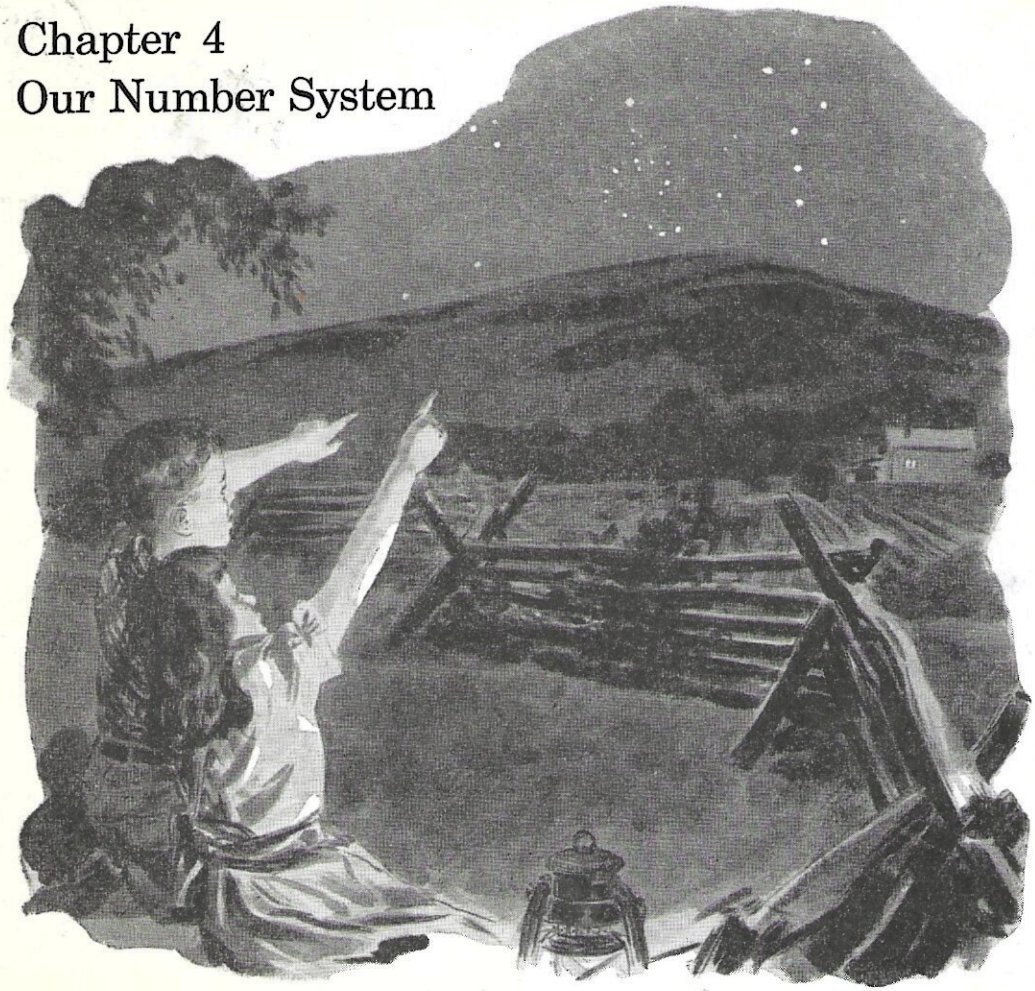
2. Jim put seeds into little boxes which he pasted into a larger box. He paid 20¢ for boxes, 15¢ for cotton to put in them, and 30¢ for cellophane to cover them. How much did his supplies cost? How much money had he left from one dollar?

3. Ted wants 24 boxes for his seed collection, but he has only 18. How many more boxes does he need?

4. Carl has 27 different kinds of seeds. Bill has 34 kinds. How many more kinds of seeds has Bill than Carl?

5. Helen pressed leaves for her collection and pasted them into a notebook, which cost 25¢. She also bought paste for 10¢ and tape for 12¢. How much did her supplies cost?

Chapter 4
Our Number System



Big Numbers

"I wonder how far away the Big Dipper is," said Joe.

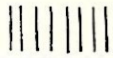
"Millions of miles, probably," answered Helen.

"That sounds like a very big number," said Jack. "I know for sure that it is a lot more than thousands."

Let us find out about millions, but first, let us see what we know about the other numbers.

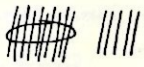
Our Number System

We use number names and number figures to think about the numbers of things. We use **single** names and **single** figures to think about **single** groups. We use **compounded** names and **compounded** figures to think about **compounded** groups.



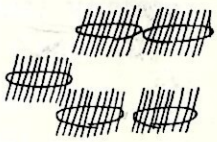
Eight
8

We think of numbers to nine as single groups. We have a single name and a single figure to stand for each group. We also think of ten as a single group, and we give it a single name, but there is no single figure for ten. We write 1 in ten's place and 0 in one's place like this: 10.



Fifteen
15

We think of each teen number as 1 ten and so many more. We give each teen number a compounded name and use two figures to write our idea. We write 1 in ten's place and the other figure in one's place.



Fifty
50

We think of twenty, thirty, forty, and so on as so many tens. Fifty means 5 tens; so we think of fifty as 5 tens. To write the idea, we write 5 in ten's place and 0 in one's place: 50.

Eighty-four means 8 tens and 4 ones, and that is the way we think about it. To write the idea, we write 8 in ten's place and 4 in one's place.

One hundred
100

One hundred is 10 tens, and that is the way we think about it. To write our idea of one hundred, we write 1 in hundred's place. The 00 put the 1 in its proper place.

A Thousand

A hundred is 10 tens.
A thousand is 10 hundreds.
A thousand is 100 tens.
A thousand is 10 times 10 times 10.

$$\begin{array}{r} 10 \\ 10 \\ \hline 100 \end{array} \qquad \begin{array}{r} 100 \\ 10 \\ \hline 1000 \end{array} \qquad \begin{array}{r} 10 \\ 10 \\ \hline 100 \\ 10 \\ \hline 1000 \end{array}$$

Suppose we have a little cube like this:

This is 1.

We have one (1) cube.

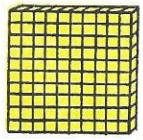
Next, suppose we have ten of these cubes in a row. How many do we have?

Here are 10.

Now let us look at 10 such rows. How many tens are there? What do we call 10 tens?

10 tens are 1 hundred: 100.

Now let us pile up ten such rows. In the big cube there are 1 thousand little cubes. We write one thousand like this: 1000. The 1 is in thousand's place.



Here are 100.

One thousand means 10 hundreds, and it also means 100 tens.

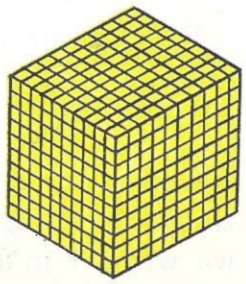
What do you think 10 thousands mean?

What do you think 100 thousands mean?

Can you read these numbers:

2,000 10,000 50,000 100,000 600,000

What do you think 1000 thousands mean? Here is the way we write it: 1,000,000.



Here are 1000.

One thousand thousands are a million.

A Million

"So a million is a thousand thousands," said Helen. "It would take a long time to count a million dollars."

"It might take a whole day," said Joe.

"I guess it would take a week," said Ruth.

What is your guess?

"See this second hand on my watch," said Miss Weldon. "How long does it take to go around once?"

"Sixty seconds, or 1 minute," answered the class.

"You can count to 60 in 1 minute. Then how many dollars could you count in 1 hour?"

"Sixty times sixty, or 3600 dollars," answered Jack.

"We are in school 6 hours each day. How many dollars could you count in 1 school day"? asked Miss Weldon.

60 dollars in 1 minute	3,600 dollars in 1 hour
60	6
3600 dollars in 1 hour	21,600 dollars in 1 day

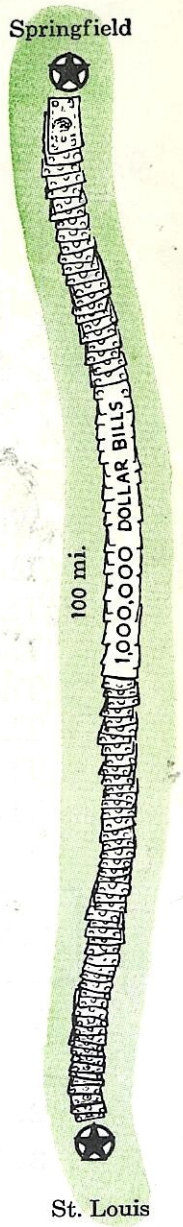
"If you took out a little time to rest, you could still count 20,000 dollars in 1 day. You go to school 5 days each week. How many dollars could you count in 1 school week?" asked Miss Weldon.

20,000 dollars in 1 day	100,000 dollars in 1 week
5	4
100,000 dollars in 1 week	400,000 dollars in 1 month

How many dollars could you count in 1 month? in 2 months? in $\frac{1}{2}$ month? in $2\frac{1}{2}$ months?

400,000 dollars in 1 month	800,000 dollars in 2 months
2	200,000 dollars in $\frac{1}{2}$ month
800,000 dollars in 2 months	1,000,000 dollars in $2\frac{1}{2}$ months

How long would it take you to count a million dollars?



What Numbers Mean

Let us think about what numbers mean.

What is the value of the first **place** of any number? the second place? the third place? the fourth place? the fifth place? the sixth place? the seventh place?

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	1	1	1	1	1	1

Ten ones are ten.
Ten tens are one hundred.
Ten hundreds are one thousand.
Ten thousands are one ten-thousand.
Ten ten-thousands are one hundred-thousand.
Ten hundred-thousands are one million.

The **value** of each **place** is ten times as much as the value of the place to its right.

What does this number mean: 4,168,579?

The 9 means 9 ones, or 9
The 7 means 7 tens, or 70
The 5 means 5 hundreds, or 500
The 8 means 8 thousands, or 8,000
The 6 means 6 ten-thousands, or 60,000
The 1 means 1 hundred-thousand, or 100,000
The 4 means 4 millions, or 4,000,000
4,168,579

The figures tell how many of each value the number has.

1. Write each of these numbers to show what it means:
   64,057 809,261 7039 3,721,590 50,608 101,692
2. What is the purpose of zero in each number?
3. Tell what 5 means in each of these numbers:
   350 5025 15,002 5,052,500 65,274 2,527,496 585

Reading Large Numbers

When Jerry studies his geography lesson, he often has to read large numbers.

The size of the United States is about 3,000,000 square miles. To be exact, it is 2,977,128 square miles. It has a population of about 150,000,000. In 1940 it had a population of 131,669,275.

To make numbers easier to read, we separate or **point off** the figures, beginning at the right, into groups of three with commas. These groups are called **periods**. Each period has a name. The period at the left will not always have three figures.

Million	Thousand	One
2,	977,	128

Million	Thousand	One
131,	669,	275

To read a number, begin at the left. Read the numbers in each period, followed by the name of the period. We do not say the name of the first (one's) period.

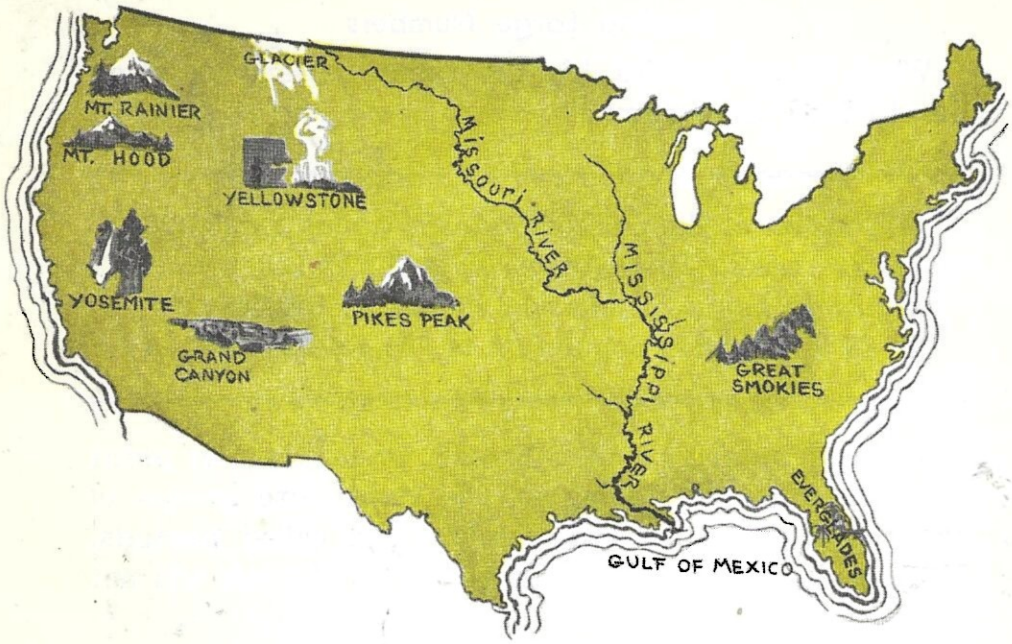
2,977,128 is read: *Two million, nine hundred seventy-seven thousand, one hundred twenty-eight.*

150,000,000 is read: *One hundred fifty million.*

131,669,275 is read: *One hundred thirty-one million, six hundred sixty-nine thousand, two hundred seventy-five.*

620,000 is read: *Six hundred twenty thousand.*

15,102 is read: *Fifteen thousand, one hundred two.*



Reading Large Numbers

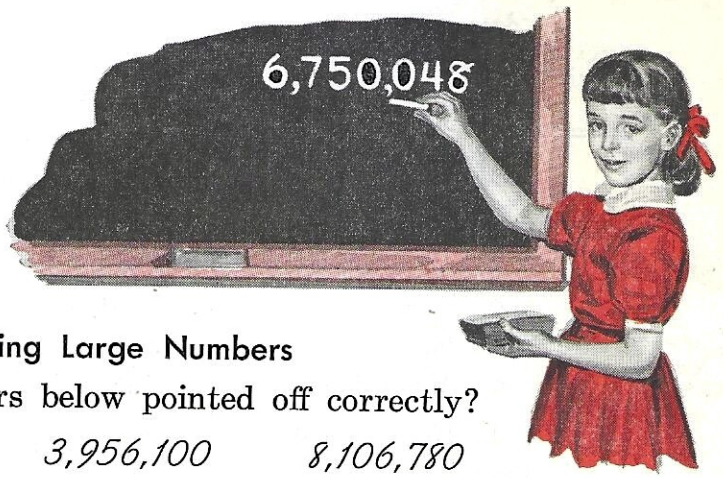
Read these statements about the geography of the United States:

1. The Mississippi River is 2470 miles long.

2. It is 3988 miles from the head of the Missouri River to the Gulf of Mexico.

3. Some of the largest national parks are: Yosemite—756,441 acres; Grand Canyon—645,296 acres; Everglades—271,008 acres; Glacier—997,248 acres; Yellowstone—2,213,207 acres; Great Smoky Mountains—461,004 acres.

4. Pikes Peak is 14,110 feet high; Mt. Rainier is 14,408 feet; Mt. Hood is 11,225 feet. Which of these peaks is the highest?



Writing Large Numbers

1. Are the numbers below pointed off correctly?

12,640,160 *3,956,100* *8,106,780*

2. Copy these numbers, mark them off into periods, then read them:

34186	8808	650721	5001294	96058	18121913
75001	60000	5526409	438095	1100001	7890234

3. Which is easier to read?

75628	or	75,628	92875	or	92,875
126422	or	126,422	754100	or	754,100
3000000	or	3,000,000	1908164	or	1,908,164
125640728	or	125,640,728	9655862	or	9,655,862

When we write thousands and millions, we write them in periods and use commas to separate the periods.

4. Write these numbers with figures:

a. Seventy-eight thousand, four hundred.
b. Nine hundred forty-six.
c. Two million, twenty-four thousand, five hundred sixty.
d. One million, three hundred forty thousand, seven.
e. Six hundred ninety-one thousand.
f. Fifty thousand, six hundred forty-one.
g. One hundred one thousand, two hundred ten.

Other Ways of Reading Numbers

1945

I live at 1945 Oak Street.
My telephone number is 1945.
About 1945 people live here.

Do you see that 1945 may be read in three ways?

a. *I live at nineteen forty-five Oak Street.*

b. *My telephone number is one, nine, four, five.*

c. *About one thousand, nine hundred forty-five people live here.*

1. Read these numbers in three ways:

1492 1835 1015 1905 1700 1650 1950

2. Numbers that stand for addresses are read:

a. I live at six hundred fifty-two Clark Street.
b. I live at six fifty-two Clark Street.
c. I live at six five two Clark Street.

3. Read these addresses in several ways:

347 Main Street 850 Ocean Drive 4412 Brooks Avenue

4. Telephone numbers are usually read by saying each figure as though it were a separate number.

2143R is read: two, one, four, three, R.
Zero in a telephone number is usually read as "oh."
2050 is read: two, oh, five, oh.
1600 may be read: one, six hundred.

5. Read these telephone numbers:

241 8645R State 4500 6051 Red

6. Read these sentences:

a. Alice was born June 5, 1908.
b. Solomon's Temple was built about 2900 years ago.
c. America was discovered by Columbus in 1492.
d. Please call Greenleaf 4450.

What Do We Know about Numbers?

1. Read these numbers. Tell what each means.

a.	6,458	18,300	20,417	1,816,439
b.	802	159,604	105,009	300,700
c.	40,020	3,001,500	2,150	8,900,000

2. What figure is in one's place in each number above? in ten's place? in hundred's place?

3. Read each number that has a figure in thousand's place; in hundred-thousand's place.

4. To mark off a number into periods, how many places do we group off with commas? With what place of the number do we start counting the figures for a period?

5. What is the name of the first period? the second period? the third period?

6. What is the purpose of zero in writing numbers?

7. In the numbers above, tell what each zero does.

8. Write these numbers:

a. Eight thousand, three hundred forty-five.

b. Two hundred forty-three thousand, seventy-nine.

c. Six hundred four.

d. Four million, one hundred thousand, nine hundred eighty.

e. Seven hundred one thousand, four hundred.

f. Fourteen thousand, five.

g. Six million, four hundred thousand.

9. Tell what 4 means in each number you wrote.

10. Write the largest four-place number.

11. Write the smallest five-place number.

Roman Numerals

Both the Arabs and the Romans gave us a way to write numbers. In our everyday work we use the Arabic numbers. We write all our numbers with the 9 figures and zero.

1 2 3 4 5 6 7 8 9 0

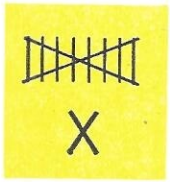
The place of the figure in the number determines its value: 10 means ten; 100 means one hundred; 110 means one hundred ten; 1000 means one thousand.

The Romans wrote their numbers with seven letters.

I	V	X	L	C	D	M
1	5	10	50	100	500	1000

They had no zero and no place value.

We use the following plan to write Roman numbers:



Rule 1

When a letter is repeated, its value is repeated.

III is 3. XXX is 30. CC is 200. MM is 2000.

Rule 2

When a letter is followed by a letter of less value, the number is the sum of the values of the letters.

VIII is 8. LV is 55. DC is 600. MC is 1100.

Rule 3

When a letter has a letter of less value before it, the number is the difference between the values of the letters.

IV is 4. IX is 9. XL is 40. XC is 90. CD is 400.

We also use Rules 1, 2, and 3 together.

XXIX is 29. XLV is 45. XCIX is 99. CDXXIV is 424.

Read: XXXIX MCM CCVIII XCIX MCDXCIII

Write: 1900 1950 595 610 1766 1948

Round Numbers

Jack Hines had driven to Cincinnati with his father.

"About how far is it from Chicago to Cincinnati?" asked Bill Reed.

"It is 300 miles in **round numbers**," answered Jack.

The speedometer record which Jack had kept showed that it was 294 miles. When Jack said that it was 300 miles, he **rounded off** 294 to the nearest hundred. Often it is easier to give distances and amounts in round numbers than in exact numbers. Instead of saying that Kingsville has a population of 11,872, we may say that Kingsville has a population of about 12,000.

We round off a number when we give the nearest ten, hundred, or thousand instead of the exact number.

Exact	*Round*	*Exact*	*Round*	*Exact*	*Round*
98	100	616	600	3887	4000

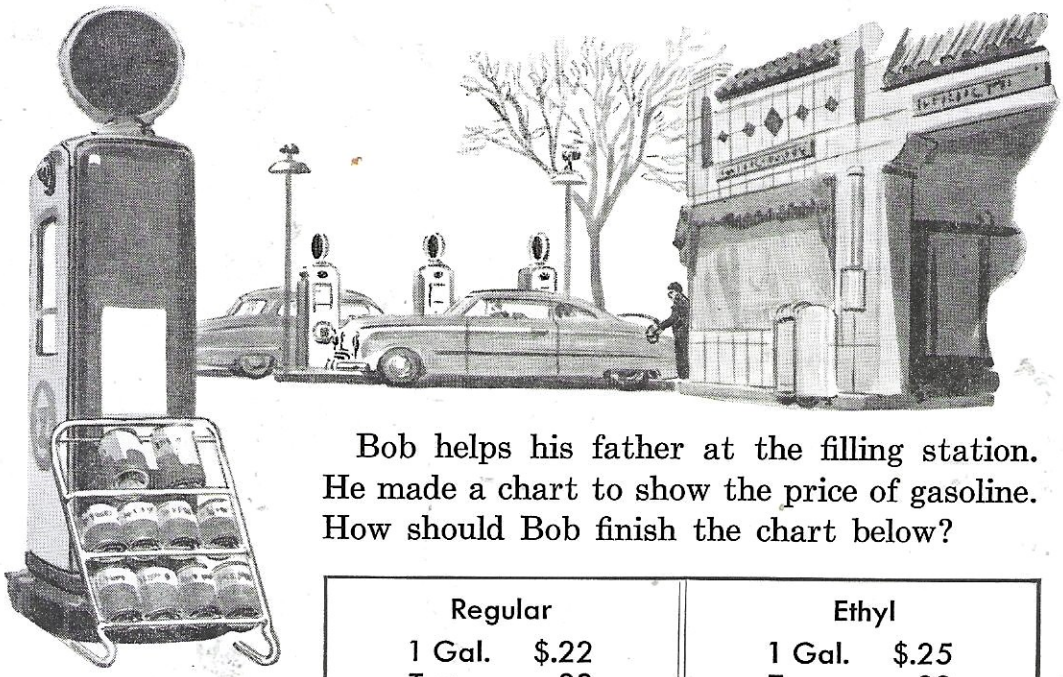
1. Give the following amounts in round numbers:

To Nearest Ten	*To Nearest Hundred*	*To Nearest Thousand*
97 tons	608 people	1886 years
49 pounds	296 children	5895 bushels

2. The table below gives the distance by car between certain cities. Round off each distance to the nearest hundred miles:

Chicago to Atlantic City	819	*Denver to Minneapolis*	887
St. Louis to Detroit	515	*Dallas to New Orleans*	504
Washington to Birmingham	769	*Chicago to Mexico City*	2162
Memphis to Los Angeles	1846	*San Francisco to Chicago*	2212

Chapter 5
Two-Step Problems



Bob helps his father at the filling station. He made a chart to show the price of gasoline. How should Bob finish the chart below?

Regular		Ethyl	
1 Gal.	$.22	1 Gal.	$.25
Tax	.03	Tax	.03
Total	$.25	Total	$.28

Gal.	Cost	Gal.	Cost
4	$1.00	4	$1.12
5	$1.25	5	
6		6	
7		7	
8		8	
9		9	
10		10	

Step 1

1 Gal.	$.22
Tax	.03
Total	$.25

Step 2

$ .25
× 4
$1.00

Problems with Two Questions

1. Tom bought 4 marbles that cost 15¢ each. Jim and Joe wanted some like them, but there were no more at the store. So Tom sold all 4 marbles to them for 80¢.

a. How much did Tom pay for the marbles?

b. How much did he make by selling them?

First, answer question *a*. What process must we use to find the answer? What two facts will we need?

$$\begin{array}{r} 15¢ \\ \times 4 \\ \hline 60¢ \end{array}$$

Tom bought 4 marbles.
Each marble cost 15¢.
Tom paid 60¢ for the marbles.

$$\begin{array}{r} 80¢ \\ -60¢ \\ \hline 20¢ \end{array}$$

Now look at question *b*. From it we know that Tom sold the marbles for more than they cost him. What process will we use to find how much more?

We need two facts. One is given in the problem: **Tom sold the marbles for 80¢**. The other fact is the answer to question *a*: **the amount Tom paid for them, 60¢**.

Tom made 20¢ by selling them.

2. Mary bought 9 baby chickens at 5¢ each. When they were large enough to fry, she sold them for $5.40.

a. How much did Mary pay for the chickens?

b. How much did she make on these chickens?

3. Mrs. Allen bought 2 dozen eggs at 45¢ a dozen and a loaf of bread for 16¢.

a. How much did the 2 dozen eggs cost?

b. How much did she pay for both bread and eggs?

Two-Step Problems

In a two-step problem there are really two questions to be answered. One question is asked in the problem, but the other question is **hidden**. In order to solve a two-step problem, you must find, ask, and answer the hidden question.

Things to Do

1. Read the problem carefully so that you understand what it is about and so that you can tell the problem in your own words.

> Billy sold 53 papers, and James sold 61. How much did they both get for them if they sold the papers at 5¢ each?

2. Read the problem again. This time you read between the lines to find and ask yourself the hidden question.

Billy sold 53 papers, and James sold 61.
How many papers did they both sell?
How much did they both get for them if they sold the papers at 5¢ each?

53 papers
61 papers
114 papers

3. Answer the hidden question as soon as you find it. You work just that much of the problem at this time.

4. Read the rest of the problem, putting the answer to the hidden question where it belongs.

How much did they both get for them if they sold the *114* papers at 5¢ each?

5. Answer the question the problem asks.

114 papers × $.05 = $5.70

How to Solve Two-Step Problems

1. A fruit store man bought 48 dozen oranges at 35¢ a dozen. He sold them at 50¢ a dozen. How much did he make on the oranges?

Let us read between the lines to find the hidden question so that we can solve the problem.

A fruit store man bought 48 dozen oranges at 35¢ a dozen. He sold them at 50¢ a dozen.
How much did he make on each dozen ?
How much did he make on 48 dozen oranges?

$$\begin{array}{r} \$.50 \\ .35 \\ \hline \$.15 \end{array}$$

$$\begin{array}{r} \$\ .15 \\ 48 \\ \hline 120 \\ 60 \\ \hline \$7.20 \end{array}$$

2. He bought 18 dozen lemons at 32¢ a dozen and sold them at 48¢ a dozen. How much did he make?

The amount that he made is called **profit.**

How do we find how much profit he made?

3. He bought 24 pecks of potatoes at 30¢ a peck and sold them at 42¢ a peck. How much profit did he make?

4. He bought 96 heads of lettuce at 7¢ a head and sold them at 12¢ a head. How much profit did he make on the lettuce?

5. He bought 48 bunches of celery at 9¢ a bunch and sold them at 15¢ a bunch. How much profit did he make?

6. He bought 36 baskets of peaches at $1.15 a basket and sold them at $1.50 a basket. How much was his profit?

7. He bought 16 baskets of plums at 45¢ a basket and sold them at 65¢ a basket. How much was his profit?

Two-Step Problems

In Column A, each problem is printed in the ordinary way with one of the questions hidden. In Column B, the question that is usually hidden is printed in the problem for you to read.

Read the problems in Column A, reading between the lines to find the hidden questions. See how many problems you can solve without looking at the problems in Column B. If you cannot find the hidden question in any problem in Column A, read the same problem in Column B, but solve the problem in Column A.

Column A

Bill sold 23 copies of a magazine, and James sold 16. How much did they both get for them at 15¢ each?

John paid 38¢ for a map book in geography and 45¢ for a workbook in history. He also spent as much for an arithmetic as he spent for both the workbook and the map book. How much did he spend for all the books?

If the cost of 2 oranges is 10 cents, what would be the cost of 12 oranges?

Column B

Bill sold 23 copies of a magazine, and James sold 16. How many did they both sell? How much did they both get for them at 15¢ each?

John paid 38¢ for a map book in geography and 45¢ for a workbook in history. How much did he spend for both? He also spent as much for an arithmetic as he did for both the workbook and the map book. How much did he spend for all the books?

If the cost of 2 oranges is 10¢, what is the cost of one orange? What would be the cost of 12 oranges?

Column A

Susan has saved $11.80. Today her father gave her $5.00. Susan wants to buy a winter coat that costs $23.75. How much more money must she save to buy the coat?

The children in our room sold popcorn to buy flags. They sold 72 sacks for 5¢ each. How many flags that cost 9¢ each can they buy with the money?

Joe had $12 in his bank. He spent all but $\frac{1}{4}$ of it for a raincoat. His father then gave him $5.00, which he put into his bank. How much money did Joe have in his bank then?

Paul Brown saved $43 last summer, but spent $14.65 of it for clothes in the fall. How much will he have to save this summer in order to have $60 by next fall?

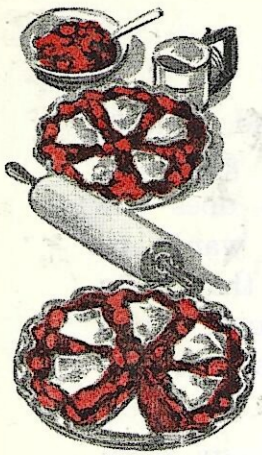
Column B

Susan has saved $11.80. Today her father gave her $5.00. How much does she have now? Susan wants to buy a winter coat that costs $23.75. How much more money must she save to buy the coat?

The children in our room sold popcorn to buy flags. They sold 72 sacks for 5¢ each. How much did they get for the popcorn? How many flags that cost 9¢ each can they buy with the money?

Joe had $12 in his bank. He spent all but $\frac{1}{4}$ of it for a raincoat. How much did Joe have left in his bank? His father then gave him $5.00, which he put in his bank. How much money did Joe have in his bank then?

Paul Brown saved $43 last summer, but spent $14.65 of it for clothes in the fall. How much does he have left? How much will he have to save this summer in order to have $60 by next fall?



Two-Step Problems

1. Mary made 2 cherry pies for Mrs. Dan. The materials for both pies cost about 48¢. Mrs. Dan gave Mary 60¢ for each pie. How much did Mrs. Dan pay for both pies? How much did Mary make on the pies?

2. Mary made 2 cherry pies for Mrs. Dan. The materials for both pies cost about 48¢. Mrs. Dan gave Mary 60¢ for each pie. How much did Mary make on the pies?

What is the **difference** between the two problems?

Can you solve problem **2** before you find the answer to the first question in problem **1**?

Problem **2** is a **two-step** problem because we need to find a fact that is not given before we can answer the question in the problem. We must find this fact from facts that are given in the problem. We must ask and answer the "hidden" question that gives us this fact.

Read each problem carefully. Find and ask the hidden question. Answer the hidden question. Read the problem again, putting the answer to the hidden question where it belongs. Then answer the question the problem asks.

3. Mr. Black raised 90 bushels of potatoes. He sold 60 bushels. He wants to put the rest of the potatoes in 2-bushel sacks.

a. _____?

b. How many sacks does he need for the potatoes?

4. The cost of 3 pencils is 15¢.

a. _____?

b. How much should 12 of these pencils cost?

5. Joe had 26 books and got 4 new ones for his birthday. To make room for them on his bookshelf, he gave 8 books to the children's library. How many books did he have then?

6. Tom had 43 marbles. He gave 17 of them to Jerry and bought 8 new ones for himself. Then how many marbles did Tom have?

7. Betty had 28 bird pictures. She gave half of them to Jane. Then May gave Betty 5 other bird pictures. How many bird pictures did Betty have for her notebook?

8. Mrs. West bought 2 dozen eggs. She used 9 of them for an angel food cake. How many eggs did she have left?

9. Bill sold 24 papers each weekday and 32 papers each Sunday. How many papers did he sell each week?

10. Tom picked 16 apples. He shared them equally with 3 friends. Then he gave one of his apples to his dad. How many apples did Tom keep for himself?

11. Sam raised 18 bushels of potatoes. He sold 10 bushels at the store. Then Uncle Jim said he would buy half of the potatoes that were left. How many bushels of potatoes did Uncle Jim buy?

Oral Problems

1. Aunt Helen gave Sally and Beth 3 boxes of shells. Each box had 12 shells in it. If the girls divide the shells equally, how many will each girl have?

2. Mary is making a penwiper for each of the 9 girls in her club. She had 3 pieces of felt, and she cut 12 circles from each piece. How many circles can she tie together for each penwiper?

3. Dick sold 6 pumpkins at 25¢ each. How much did he get for them all?

4. Ann wants to make little bunches of asters, 3 asters to a bunch. She picked 13 asters. Then she picked 8 more. How many bunches can she make?

5. Joe delivered papers to 14 people each day. Two of his customers moved away, but soon he had 5 new ones. To how many people did he then deliver papers each day?

6. It takes 9 eggs to make Mrs. Allen's angel food cake. If she has 3 dozen eggs and makes 3 cakes, how many eggs will she have left?

7. For each of the 4 times that Bill ran errands for Mrs. Brown, she gave him a dime. With this money he bought a magazine for 25¢. How much did he have left?

8. Bob earned 15¢, 20¢, and 25¢ running errands for three people. With this money he bought a book that cost 60¢. How much had he left?

Practice in Adding

9. 635 + 410 + 297 + 118
10. 700 + 52 + 1007 + 509
11. 1418 + 906 + 462 + 2931
12. 1070 + 50 + 408 + 1980

The Camera Club

1. There are 16 members in the Camera Club. Each member pays 5¢ a week for dues. How much money is paid into the club for dues in one year, or 52 weeks?

2. It costs 35¢ to have a roll of film developed and 5¢ for each picture that is printed. Joe uses films that take 8 pictures. What should he pay to have a roll of film developed and 1 print made of each of the 8 exposures?

3. A film that takes 8 pictures in color costs $1.37. The same-sized film for black and white pictures costs 3 rolls for $1.20. What is the difference in price of a roll of the two kinds of film?

4. Jack suggested that they could save money by developing the films and printing the pictures themselves. A beginner's developing set cost $3.98. A better set cost $19.75. How much more did the better set cost than the beginner's set?

5. To have pictures enlarged, they pay $1.00 for 4 of one kind, or 36¢ each. How much less does each picture cost if they get 4 of a kind made rather than just one?

Two-Step Problems

1. Mr. Sellers bought 72 boxes of strawberries at 23¢ a box and sold them at 45¢ a box. How much did he make on the strawberries?

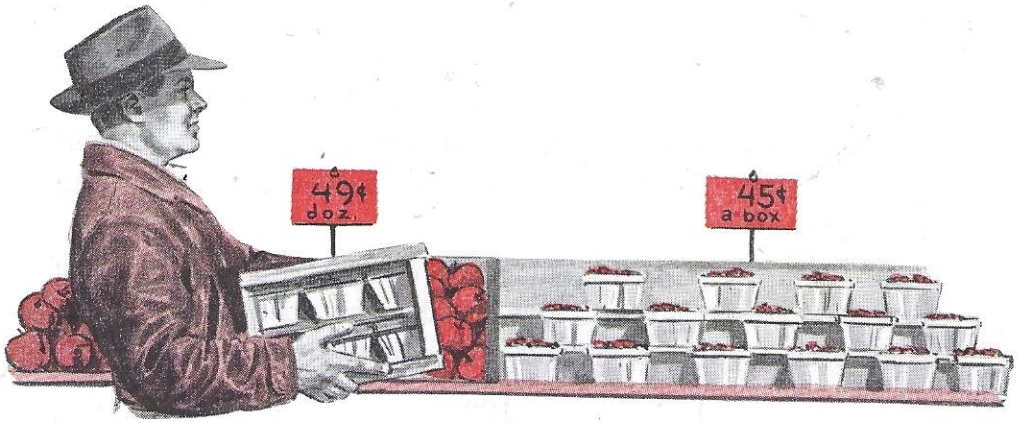
2. Mr. Sellers bought 60 dozen eggs at 33 cents a dozen and sold them at 45 cents a dozen. How much did he make?

3. Marie wants to buy a sweater and dress for herself and a gift for her mother. She has $10.00 to spend. The sweater costs $2.48, and the dress costs $3.75. How much will Marie have left to spend for the gift for her mother?

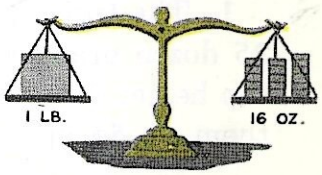
4. Jimmie had 14 sticks of chewing gum. He kept 2 sticks for himself and divided the rest among his 4 friends. How many sticks did he give to each friend?

5. Elmer Hall sells papers after school. The papers cost him 3¢ each, and he sells them for 5¢ each. Last week he sold 96 papers. How much did he make?

6. Mrs. Jenkins paid 60 cents for oranges that cost 5 cents each. She divided them among 6 girls. How many oranges did she give each girl?



Measures and Weights



1. In 1 foot there are *12* inches.

2. In 1 yard there are _____ feet.

3. In 1 yard there are _____ inches.

4. The one-pound weight balances the 16 one-ounce weights. There are _____ ounces in 1 pound.

5. There are _____ pounds in a ton.

6. The girls poured water from the quart bottles into the gallon measure. It took the water from _____ quart bottles to fill the gallon measure. There are _____ quarts in 1 gallon.

7. The grocer had a bushel of potatoes which he put into peck baskets. The bushel of potatoes filled _____ peck baskets. There are _____ pecks in a bushel.

Length

12 inches = 1 foot
3 feet = 1 yard

Weight

16 ounces = 1 pound
2000 pounds = 1 ton

Capacity

Liquid

2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon

Dry

2 pints = 1 quart
8 quarts = 1 peck
4 pecks = 1 bushel

Problems in Measures and Weights

Read **between the lines.** See if you can **find the hidden question** in each problem in Column A. If you cannot, then study the same problem in Column B. Do not use Column B unless you need to.

Column A

1. The fruit store man had 25 dozen oranges. How much can he get for them if he sells them at 5¢ apiece?

2. He bought 15 barrels of apples from a farmer. Each barrel held 3 bushels. How many pecks of apples did he buy?

3. Mr. Benson bought 24 yards of fencing material for his chicken yard. The material cost 15¢ a foot. How much did the material cost?

4. A farmer sold 12 bushels of hickory nuts at 15¢ a quart. How much did he get for them?

5. How much will two watermelons weighing 24 pounds and 18 pounds cost at 3¢ a pound?

Column B

1. The fruit store man had 25 dozen oranges. *How many oranges did he have?* How much can he get for them if he sells them at 5¢ apiece?

2. He bought 15 barrels of apples from a farmer. Each barrel held 3 bushels. *How many bushels did he buy?* How many pecks did he buy?

The Hidden Question

How many feet of fencing material did he buy?

The Hidden Question

How many quarts did he sell?

The Hidden Question

How much did both watermelons weigh?

Measures and Weights

1. In 1 foot there are 12 inches.

2. In 1 yard there are _____ feet.

3. In 1 yard there are _____ inches.

4. The one-pound weight balances the 16 one-ounce weights. There are _____ ounces in 1 pound.

5. There are _____ pounds in a ton.

6. The girls poured water from the quart bottles into the gallon measure. It took the water from _____ quart bottles to fill the gallon measure. There are _____ quarts in 1 gallon.

7. The grocer had a bushel of potatoes which he put into peck baskets. The bushel of potatoes filled _____ peck baskets. There are _____ pecks in a bushel.

Length

12 inches = 1 foot
3 feet = 1 yard

Weight

16 ounces = 1 pound
2000 pounds = 1 ton

Capacity

Liquid

2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon

Dry

2 pints = 1 quart
8 quarts = 1 peck
4 pecks = 1 bushel

Problems in Measures and Weights

Read **between the lines.** See if you can **find the hidden question** in each problem in Column A. If you cannot, then study the same problem in Column B. Do not use Column B unless you need to.

Column A

1. The fruit store man had 25 dozen oranges. How much can he get for them if he sells them at 5¢ apiece?

2. He bought 15 barrels of apples from a farmer. Each barrel held 3 bushels. How many pecks of apples did he buy?

3. Mr. Benson bought 24 yards of fencing material for his chicken yard. The material cost 15¢ a foot. How much did the material cost?

4. A farmer sold 12 bushels of hickory nuts at 15¢ a quart. How much did he get for them?

5. How much will two watermelons weighing 24 pounds and 18 pounds cost at 3¢ a pound?

Column B

1. The fruit store man had 25 dozen oranges. *How many oranges did he have?* How much can he get for them if he sells them at 5¢ apiece?

2. He bought 15 barrels of apples from a farmer. Each barrel held 3 bushels. *How many bushels did he buy?* How many pecks did he buy?

The Hidden Question

How many feet of fencing material did he buy?

The Hidden Question

How many quarts did he sell?

The Hidden Question

How much did both watermelons weigh?

Problems in Measures and Weights

1. The three Stollard boys gathered and husked 7 bushels of walnuts. They measured them out into peck sacks and sold them from house to house for 35 cents a peck. How much were they paid for the walnuts?

2. At Boy Scout Camp the boys were served ice cream at dinner. The camp cook had to buy 8 gallons of ice cream to have enough to go around. How much did the ice cream cost at 75 cents a quart?

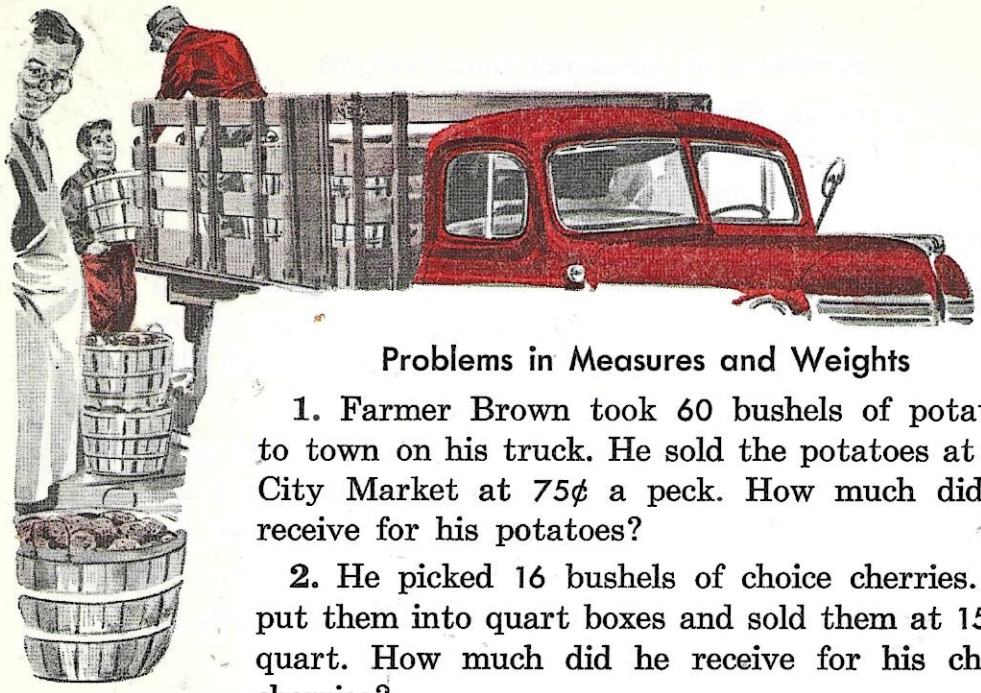
3. A large grocery company bought 1200 one-peck sacks of potatoes. The potatoes cost the company $1.85 a bushel. How much did the company have to pay for all the potatoes?

4. How many rosettes can be made from 20 yards of ribbon if 9 inches are needed to make one?

5. A man wanted to buy 65 yards of wire fencing material. He was told that the cost of the material was 16¢ a foot. How much would he have to pay for the fencing material?

6. How much do 84 quarts of milk cost if the milk is sold at 7 cents a pint?

7. At 5 cents a pint, how much can a farmer get for 18 gallons of milk?



Problems in Measures and Weights

1. Farmer Brown took 60 bushels of potatoes to town on his truck. He sold the potatoes at the City Market at 75¢ a peck. How much did he receive for his potatoes?

2. He picked 16 bushels of choice cherries. He put them into quart boxes and sold them at 15¢ a quart. How much did he receive for his choice cherries?

3. He picked 38 bushels of peaches. By putting them into peck baskets and marketing them himself, he was able to sell them at 75¢ a basket. How much did he get for his peaches?

4. He picked 12 barrels of apples, each holding 3 bushels. He put the apples into sacks, each holding a peck. How many peck sacks of apples did he have?

5. Caleb and his brother gathered 3 bushels of chestnuts. They sold the chestnuts for 10 cents a pint. How much did they receive for them?

6. "Apples are selling at two prices," said Jack. "We can buy a bushel of apples for $1.50, or we can buy them by the peck at 45¢."

What is the difference in the two prices?

Grade A Milk.....23¢ qt.	Coffee Cream.....56¢ pt.
Buttermilk.....21¢ qt.	Butter.....78¢ lb.
Chocolate Milk.....26¢ qt.	Cottage Cheese.....26¢ pt.

The Milkman

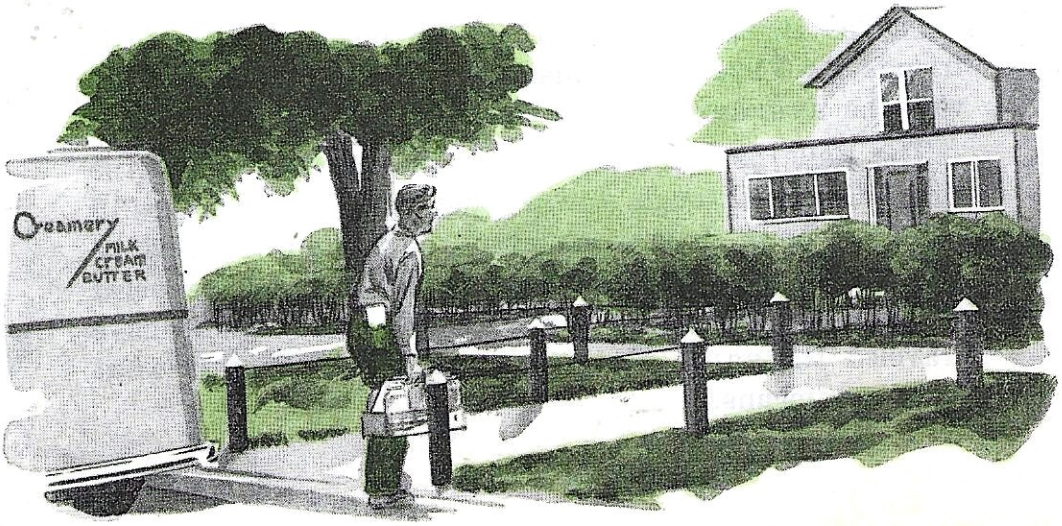
1. Mrs. West bought 4 quarts of grade A milk. If she pays for it with a dollar bill, how much change should she get back?

2. Mrs. Jackson bought 1 quart of chocolate milk, 1 pint of coffee cream, and $\frac{1}{2}$ pound of butter. How much was her bill?

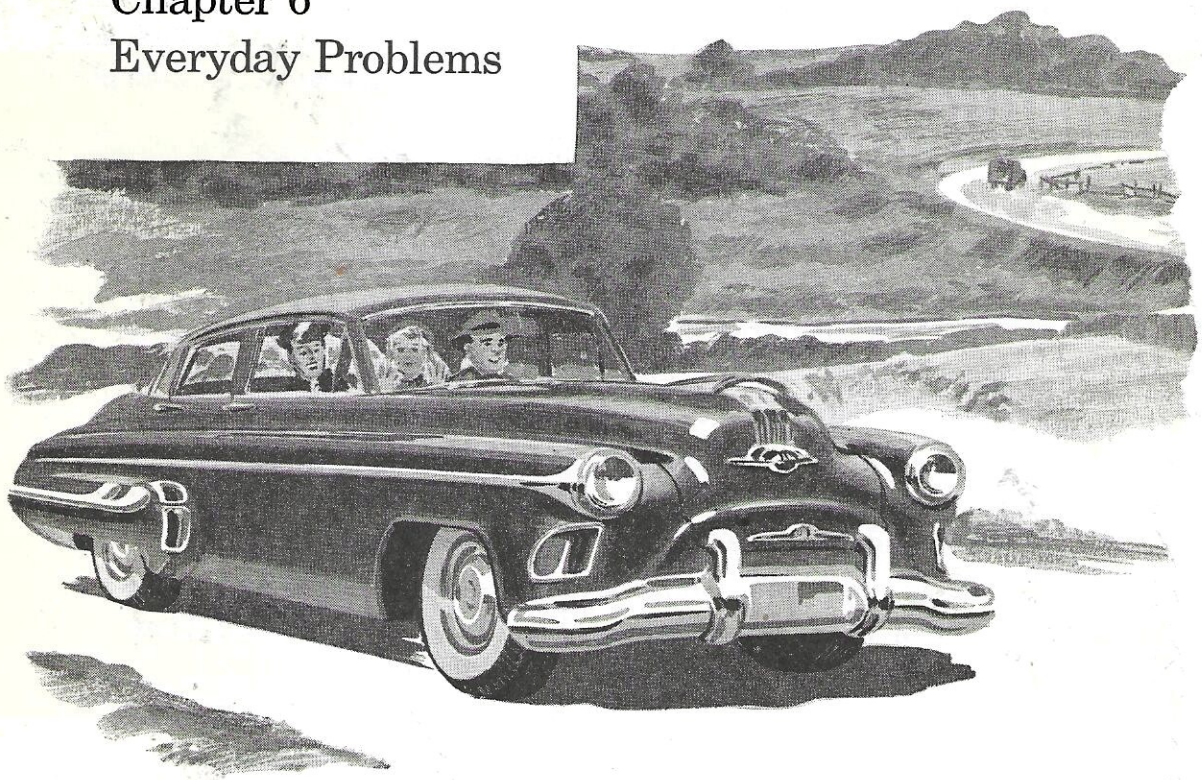
3. Mrs. Benton bought 1 pint of cottage cheese, 1 pound of butter, and 2 quarts of grade A milk. How much did she owe?

4. On one of his milk routes a milkman delivered 552 pints of milk. How many gallons of milk was that? How many quarts?

5. How many quart bottles can be filled with 72 gallons of milk? How many pint bottles can be filled with the same amount?



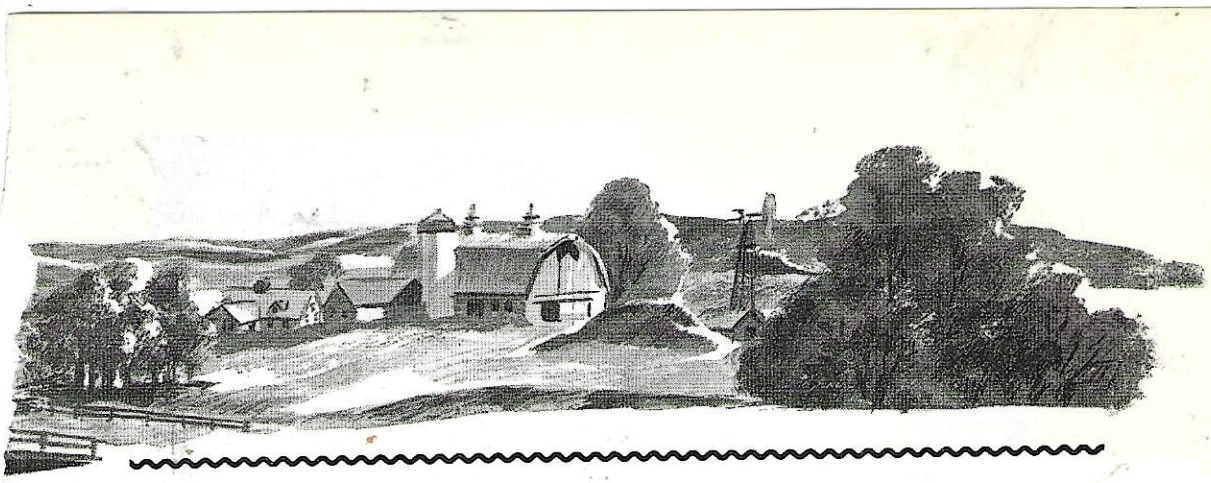
Chapter 6
Everyday Problems



The Average

1. The Ballard family drove 185 miles to visit their friends the Lakes. They made the trip in 5 hours. What was the **average** distance traveled each hour?

The Ballards did not drive at the same speed all the time. Going through towns they slowed down to 15 miles an hour. In the country they often traveled as fast as 50 miles an hour. But **suppose** they had traveled at the **same speed all the way**. Then they would have traveled the **same distance each hour**. That is what **average** means.



To find this average, we divide the total distance by the number of hours.

The Ballards would have traveled 37 miles per hour if they had traveled the same distance each hour.

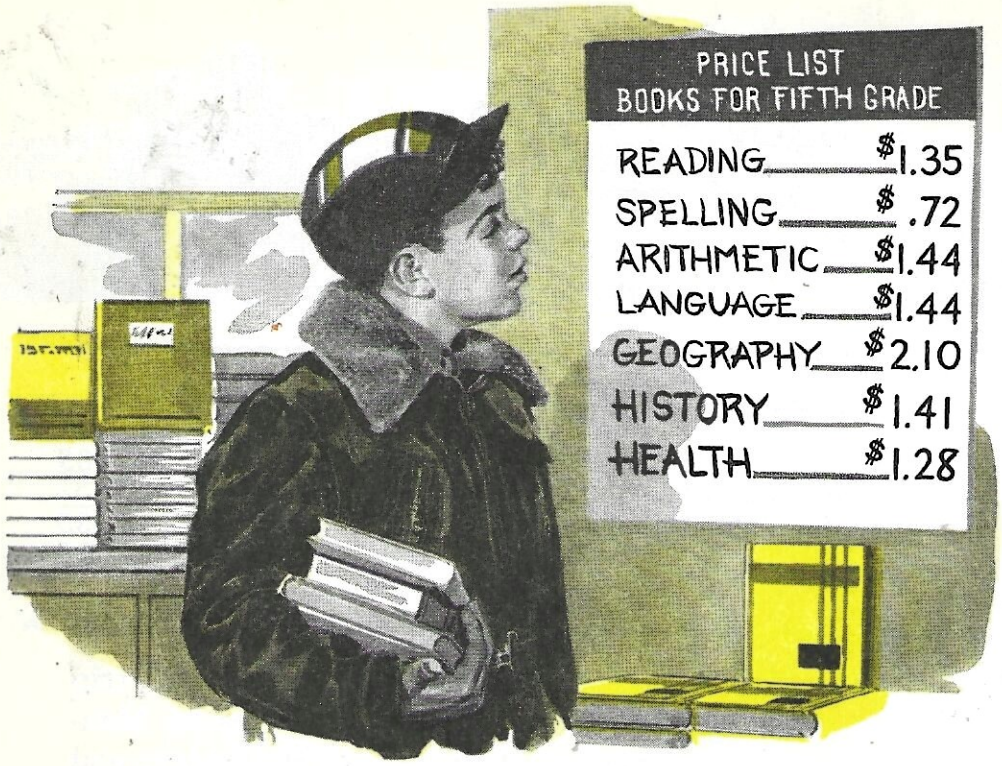
$$5\overline{)185}\quad 37,\ 15,\ 35,\ 35$$

2. The Bell family took a four-day automobile trip during their vacation. They traveled 152 miles on Monday; 76 miles on Tuesday; 47 miles on Wednesday; and 205 miles on Thursday. What was the average distance they traveled each day?

3. On the first day they traveled from home to Camp Joy, a distance of 152 miles, in 4 hours. On the average, how many miles did they travel each hour?

4. Their expenses for the 4 days were as follows: $11.96 for the first day; $9.82 for the second day; $10.35 for the third day; and $7.59 for the fourth day. How much was the average expense for each day?

5. Jane and her father went for a trip one week end. They started on Friday evening and traveled 75 miles. On Saturday they traveled 215 miles, and on Sunday, 184 miles. Find the average distance traveled each day.



The School Bookstore

In the school bookstore the price list of books for the fifth grade was tacked on the wall. When school started in September, the pupils were given a time to go to the bookstore to buy the books they needed.

1. How much do all the books on the list for the fifth grade cost?

2. How much is the average cost (to nearest cent)?

3. June Stanton's brother, who was in Grade 5 the year before, gave her the reading and language books. June bought the rest and paid for them with a 10-dollar bill. How much change should June receive?

4. Billy Jones bought all the books but the reading and arithmetic books. How much did each book that he bought cost on the average?

5. Jim Bender said, "I have to buy a geography and a language book. Dad gave me four dollars."

Does Jim have enough money to buy his books? How much will he have left?

6. Helen Hall bought all the books on the list except the speller. She bought a secondhand speller for 50¢. How much did her books cost?

7. In a small school there are 6 pupils in the fifth grade. How much will the books for the class cost?

8. Tom Brown bought a geography and a history. Joe Mills bought an arithmetic, a health book, a reader, and a language book. Who spent more for books? How much more?

9. Let us compare the prices of some of the books.

a. An arithmetic costs *twice* as much as a speller.

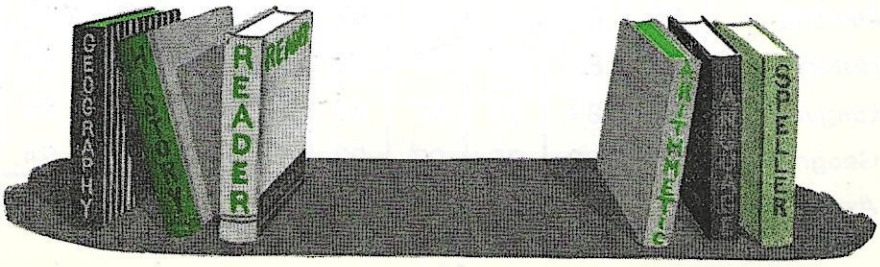
b. A geography costs about ____ times as much as a speller.

c. A speller costs about ____ as much as a reader.

d. Which books cost about the same amount?

10. Which boy, Harry or Walter, paid more for books?

Harry's books *Walter's books*



Averages

1. Helen had these scores on her test record at the end of the last month of school: Arithmetic, 92; Reading, 92; History, 89; Language, 85; and Geography, 82. What was Helen's average score for the year?

First, find the total:

Arithmetic	92
Reading	92
History	89
Language	85
Geography	82
	440

Next, divide by the number:

$$5\overline{)440}\quad 88,\ 40,\ 40$$

The total of Helen's scores is 440. Suppose that she had made the same score in each of her 5 subjects; that score would have been 88 in each subject. We say that her average was 88.

2. Here are the scores of William Watson in some of the tests he had in the fifth grade. Find his average score for each month. Find the average score in arithmetic for the year.

	Sept.	*Oct.*	*Nov.*	*Dec.*	*Jan.*	*Feb.*	*March*	*April*	*May*
Arithmetic	79	82	84	85	85	85	90	90	95
Reading	80	83	82	86	82	85	90	91	92
History	87	87	86	89	90	90	95	97	97
Language	84	84	83	87	85	87	87	89	92
Geography	90	89	90	93	93	93	93	93	94
Average									

How Well Can You Solve Problems? [Test]

1. During July Bill worked in Mr. Dan's grocery store. He worked 6 hours a day for 26 days. Mr. Dan paid him 25¢ an hour. How much did Bill earn at the grocery?

2. The pupils at Riley School made money by selling little felt caps made in their school colors. They bought 50 caps at 17¢ each and sold them all at 25¢ each. How much did they make on the caps?

3. Jim earned $9.90 in 6 days by mowing lawns. What were his average earnings each day?

4. Alice saves money to buy her school supplies. She has $2.85. How much more does she need in order to buy her reader for $1.58, her arithmetic for $1.28, and a notebook for $.25?

5. Jane made 4 dozen cookies on Saturday morning. In the afternoon she served 16 of them to the girls who came to visit her. How many cookies were left?

6. Mrs. Olds promised to take 60 cookies to the church supper. She has made 3 dozen of them. How many more cookies must she make?

7. Five boys and 6 girls are going on a picnic. Sue offered to make 3 sandwiches for each of them. How many sandwiches should she make?

8. Jim raised 45 pounds of onions. He sold 25 pounds at the grocery store. The rest he put into 5-pound sacks to keep for winter use. How many sacks did he need?

9. Jim sold 25 pounds of onions at 5¢ a pound. How much more does he need to get a model airplane that costs $1.59?

Review Problems

1. The Sports Shop advertised boys' baseball uniforms for $2.48 each. If 9 boys on the baseball team buy uniforms, how much will all the uniforms cost?

2. The Grant Junior High School bought 5 basketball sweaters to give to the members of the school team. The school paid $6.90 for the sweaters. How much did each sweater cost?

3. A clothing store had an after-Christmas sale. During the first day the store sold 7 overcoats for $17.50 each. How much did the store get for the overcoats?

4. Mr. Hunter bought an overcoat for $17.50, a suit of clothes for $23.48, and a pair of shoes for $3.98. How much did they cost altogether?

5. Mr. Hunter gave the clerk $50.00 in bills to pay for the things he bought. How much change did Mr. Hunter get back?

6. The store bought 8 spring suits of a certain kind, and paid $174.00 for them. How much did the store pay for each suit on the average?

Making and Saving Money

Tommy Bridges delivers the evening paper to a number of houses in Bland. He runs errands and does other jobs. Little by little he is saving his money. He is going to college some day and will use what he has saved to help pay his expenses.

1. He collects 24¢ for delivering a paper for a week. Of this he must turn in 18¢ to the publisher. During a certain week he delivered papers to 35 houses. How much did he make that week?

2. Tommy kept an account of the papers he delivered each week for a year. During the year he delivered, and collected for, an average of 32 papers a week. How much did he make delivering papers during the year?

3. In the spring he whitewashed some trees for the neighbors. The lime for it cost 50¢. He whitewashed 27 trees at 15¢ a tree. How much did he make doing that?

4. In the summer he mowed lawns and ran errands. He charged 50¢ for mowing a front lawn and 75¢ for mowing both front and back lawns. During July he mowed 6 front lawns and 8 front and back lawns. How much did he make mowing lawns in July?

5. Tommy has 47 of the 75 Savings Stamps needed to fill his stamp book. How many more Stamps does he need to fill his book? How much money must he save before he can fill his book and buy a Bond at $18.75?

Making and Saving Money

1. Tommy kept an account of the money he had received during the year. These are the amounts he made:

For delivering papers	$99.84
For whitewashing	3.55
For mowing lawns (June)	6.00
For mowing lawns (July)	9.00
For mowing lawns (August)	5.50
For running errands	5.20

How much did Tommy make during the year?

2. How much did Tommy make each month, on the average, for mowing lawns?

3. At the beginning of the year Tommy had $12.75. His uncle sent him $5.00 for his birthday. If he had kept all he had received during the year, how much would he have had at the end of the year?

4. During the year Tommy bought a suit, an overcoat, and shoes. He paid for his schoolbooks. He went a good many times to picture shows. He spent some money for other things. Tommy kept an account of all this, which he labeled, "What I Spent."

This is his account:

What I Spent

Jan.	$2.38	*May*	$6.57	*Sept.*	$24.50
Feb.	3.45	*June*	3.70	*Oct.*	1.75
March	4.20	*July*	8.95	*Nov.*	3.78
April	2.65	*Aug.*	19.75	*Dec.*	10.60

How much did he spend? How much did he have left?

Making and Saving Money

Helen Wallace is given an **allowance** of 25 cents each week by her parents. She also makes some money by helping out at home and by taking subscriptions for magazines.

During January last year, Helen made a record of the money she received and of the money she spent. She ruled a page of her notebook and kept her account like this:

What I Received		*What I Spent*	
Jan. 1. Money on hand	$2.78	Jan. 1. Picture show	$ .35
" 6. Selling magazines	.20	" 6. Candy	.20
" 8. Allowance	.25	" 9. Ice cream	.15
" 13. Selling magazines	.95	" 13. Picture show	.35
" 15. Allowance	.25	" 17. Ball game	.25
" 17. Cleaning kitchen	.40	" 20. Sweater	1.98
" 20. Errands	.30	" 25. Basketball game	.25
" 22. Allowance	.25	" 29. Candy and show	.50
" 25. Selling magazines	1.25	*Total*	$
" 29. Allowance	.25		
" 31. Sweeping and dusting	.50	Jan. 31. Money on hand	$____
Total	$		

How much did she have left at the end of the month?

Saving Money

Ruth Wilson is saving her money at the Riverside Bank. She has put in some money, and she has spent some. Now she is finding out how much money she should have left in her account.

Here are her figures. Did she figure correctly?

October 1

How much I had in the bank
the first of September $34.68

How much I put in the bank in September:

What I had saved from my errands during the summer	$ 9.35
First week, from allowance	.50
Second week, " "	.50
Third week, " "	.50
Fourth week, " "	.50
Altogether	$11.35

$34.68 } How much in bank if I had
11.35 } not spent any
$46.03

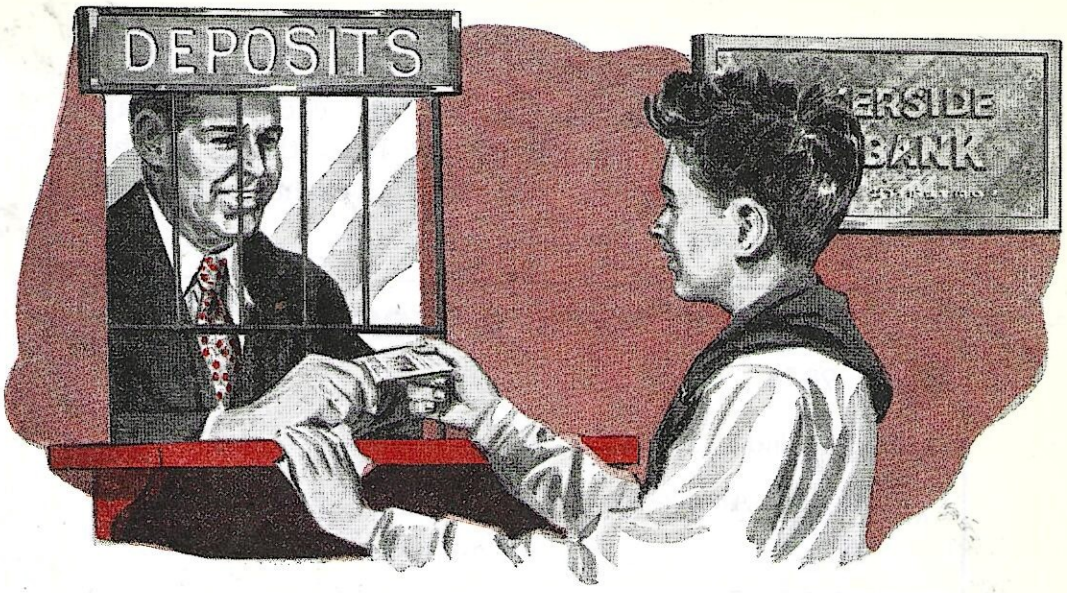
19.72
$26.31

This is how much I should have in my account.

I spent:

for shoes	$ 4.75
for sweater	1.98
for dress	2.50
for suit	6.85
for books	3.64
	$19.72

I drew this much from my account at the bank.



Saving Money

Every Monday is Bank Day at the Riverside School. The pupils bring the money they wish to save, and it is **deposited** in the Riverside Bank.

1. Ruth Wilson had $34.68 in her account the first of September. During the month she deposited $9.35 of her summer savings and $2.00 of her allowance money. How much did she then have in her account?

2. Ruth spent $19.72 for clothes and books. She drew this much out of her account. How much did she have left in her account?

3. Altogether the pupils at the Riverside School had $4,260.58 in the bank. When school began in September, they drew out $1,248.50 to help pay for their school-books and clothes. How much did they all have left in the Riverside Bank?

Grocery Bills

Mrs. Archer pays her grocery bill each Saturday morning. During the week when she buys things at the store, the grocer charges them and gives her a bill.

This is the way a bill looks:

Fifth Avenue Grocery

Phone 9876 — 842 5th Ave.

Lakeview, Ind. *Sept. 15,* 19____

Mrs. *W. R. Archer*

	Account Forwarded	$4	62
	1 loaf bread		15
	1 doz. eggs		40
	5 lb. sugar		43
	1 lb. coffee		77
	6 oranges		24
	3 grapefruit		25
	3 lb. beans		21
		2	45
		4	62
		$7	07

Your account to date. If error is found **return at once** for correction.

Is Mrs. Archer's bill correct?

Checking Grocery Bills

Here are some bills that Jack Woods made out for his customers. Check them to see if he added correctly.

Mrs. Archer

Account forwarded		$6.42
Bacon	$ .37	
Eggs	.35	
Apples	.48	1.20
		$7.62

Mrs. Brown

Account forwarded		$4.82
Coffee	$ .32	
Sugar	.35	
Eggs	.35	
Butter	.38	1.30
		$5.12

Mrs. Johnson

Account forwarded		$5.46
Sugar	$ .35	
Oranges	.28	
Bananas	.23	
Bread	.15	.96
		$6.42

Mrs. Hall

Account forwarded		$6.75
Roast	$1.63	
Potatoes	.56	
Spinach	.24	
Cabbage	.18	2.61
		$9.36

Mrs. Johnson

Account forwarded		$6.42
Ham	$2.57	
Potatoes	.56	
Butter	.38	
Grapefruit	.25	3.76
		$10.18

Mrs. Burton

Account forwarded		$2.47
Cheese	$ .28	
Butter	.38	
Apples	.48	
Beans	.25	1.39
		$4.96

Miss Hays

Account forwarded		$4.28
Bananas	$ .27	
Eggs	.72	
Bacon	.58	1.57
		$5.85

Mr. Black

Account forwarded		$8.10
Cheese	$ .36	
Butter	.38	
Orange juice	.27	1.01
		$9.11

Should customers check their bills? Why?
Should clerks check the bills they make out? Why?

Two-Step Problems

1. Henry Wells sold 28 magazines, and his sister Alice sold 18. How much were they both paid if they sold each magazine for 25¢?

2. Henry Wells and his sister paid 16¢ each for some magazines. They sold them for 25¢ each. How much did they make on 46 magazines?

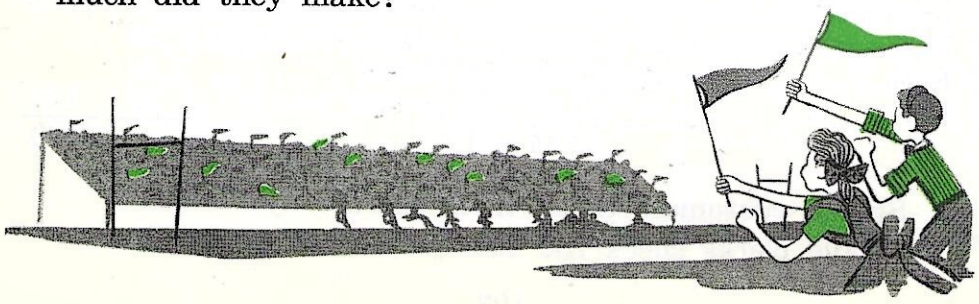
3. Alice Wells has $14.65 in the school savings bank. How much more does she need to have enough to buy a coat that costs $16.75 and a dress that costs $7.98?

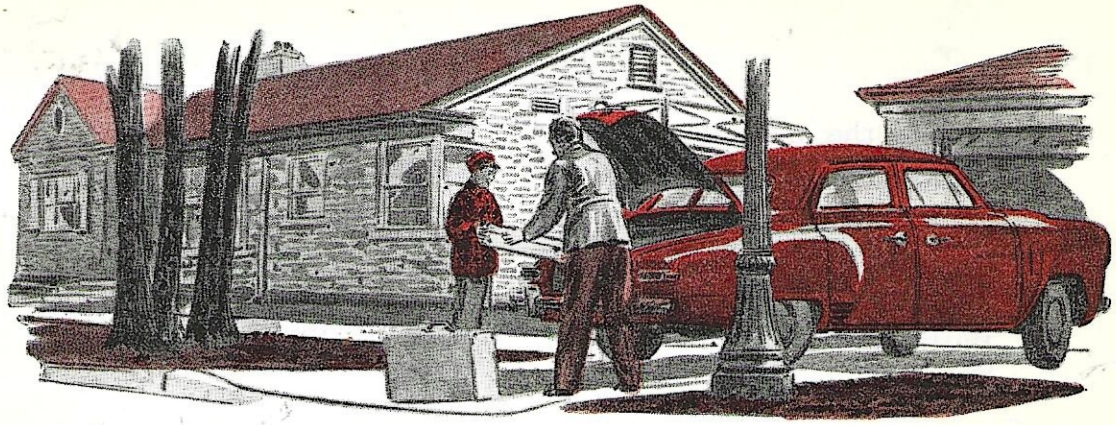
4. A grocer bought 120 dozen eggs at 27¢ a dozen and sold them at 32¢ a dozen. How much profit did he make?

5. During the month of July, William Henderson worked 6 hours a day for 26 days clerking in a grocery. He was paid at the rate of 25¢ an hour. How much was he paid for the month of July?

6. Jack Stump had $43.18 in the school savings bank. He drew out enough to buy a school suit for $16.75 and schoolbooks and supplies that cost $6.00. How much did he have left in the bank?

7. The pupils at the Consolidated High School bought 50 small flags on canes for 17¢ each. At the football game they sold all the flags on canes for 25¢ each. How much did they make?





An Auto Trip

This is Tom's record of the family's expenses on a week-end auto trip to visit friends.

EXPENSES OF AUTO TRIP				
	Friday	*Saturday*	*Sunday*	*Totals*
Food	$4.30	$5.98	$5.15	
Gasoline	$3.36	$5.60	$2.28	
Oil	$1.44		$ .72	
Repairs		$4.65	$1.35	
Totals				

Answer these questions from Tom's record:

1. What was the total spent for food?
2. What were the total expenses (gasoline, oil, repairs) on the car?
3. How much was spent each day?
4. What was the total cost of the trip?
5. This was how much per day on the average?

How Much Change?

Find the amount of each purchase and the amount of change Jack returned to each customer:

Mrs. White

Bacon	$ .53
Eggs	.60
Butter	.42
Sugar	.30

Gave Jack: $5.00

How much change?

Mrs. Asher

Cheese	$ .15
Bread	.11
Beans	.23
Peas	.28

Gave Jack: $1.00

How much change?

Mrs. Brown

Cookies	$ .27
Milk	.18
Apples	.24
Cheese	.32

Gave Jack: $1.25

How much change?

Mrs. Ballard

Coffee	$ .32
Sugar	.60
Cereal	.22

Gave Jack: $1.50

How much change?

Mrs. Walters

Ham	$3.60
Bacon	.53
Chicken	1.14

Gave Jack: $10

How much change?

Mrs. Allen

Sausage	$ .84
Cream	.36
Eggs	.60

Gave Jack: $2.00

How much change?

Mr. Jackson

Potatoes	$ .53
Butter	.42
Eggs	.60
Roast	1.07
Bacon	.43

Gave Jack: $5.00

How much change?

Mrs. Easton

Peaches	$ .55
Corn	.28
Cake	.39
Macaroni	.24
Cheese	.18

Gave Jack: $2.00

How much change?

Mrs. Mason

Oranges	$ .28
Bread	.16
Bacon	.58
Butter	.42
Sugar	.60

Gave Jack: $5.00

How much change?

Mrs. West

Bacon	$ .60
Bread	.16
Milk	.16

Gave Jack: $1.00

How much change?

Mrs. Wells

Apples	$ .24
Eggs	.60
Coffee	.32

Gave Jack: $2.00

How much change?

Mrs. Holt

Milk	$ .32
Bread	.16
Sugar	.30

Gave Jack: $5.00

How much change?

Test

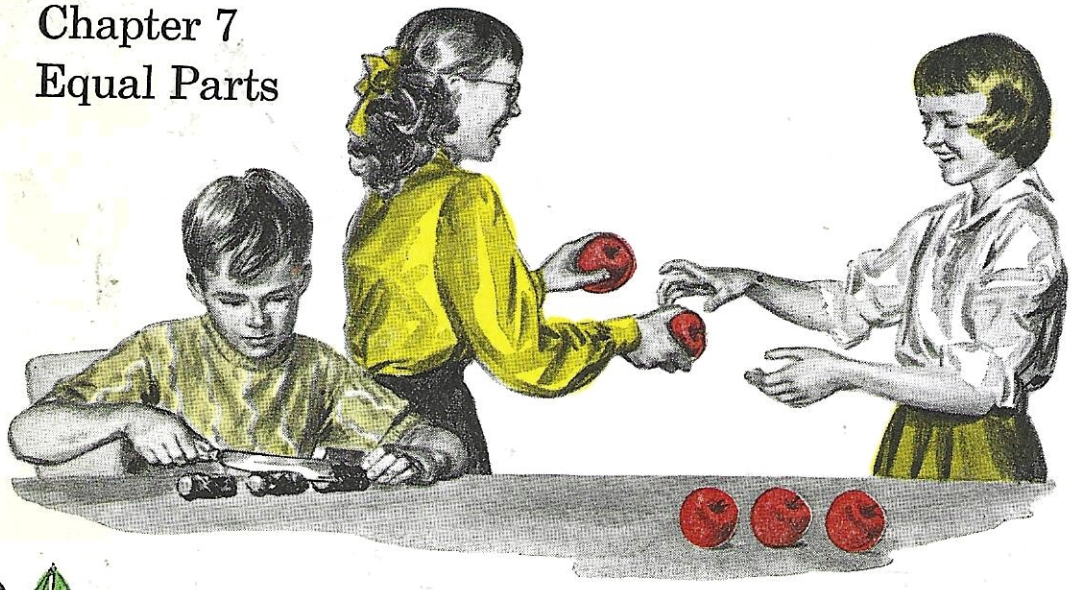
1. There are 36 *inches* in a yard.
2. There are _____ _____ in a gallon.
3. There are _____ pecks in a bushel.
4. There are _____ quarts in a bushel.
5. To change feet to yards, *divide* by 3.
6. To change yards to inches, _____ by 36.
7. To change hours to minutes, _____ by 60.
8. To change weeks to days, _____ by 7.
9. To change pints to gallons, _____ by 8.
10. To change quarts to bushels, _____ by 32.

From the list of words in the box choose the correct one for each of the blanks in the sentences below:

11. We measure the length of a sheet of paper in _____.
12. We measure the amount of milk in a bottle in _____.
13. We measure the distance between towns in _____.
14. We measure the weight of a package of tea in _____.
15. We measure the amount of coal Mr. Smith needs for his furnace in _____.
16. We measure the length of ribbon on a spool in _____.
17. We measure the quantity of apples on Farmer Brown's truck in _____.
18. We measure the quantity of strawberries Mrs. Jackson buys for shortcake in _____.

bushels
feet
gallons
inches
miles
ounces
pints
pounds
tons
yards

Chapter 7
Equal Parts



Parts of Things

Did you ever stop to think how often we use parts of things?

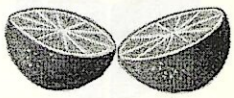
Bob wants to share his stick of candy with Tom and Jim. Why do you think he is working so hard at it? Could it be because he is trying to get the three pieces the same size? If he can get them equal, what part of the candy will each boy have?

How many apples has Jane? How many apples is she giving to Ann? Two of the five apples are two fifths of the apples. Jane is giving Ann two fifths of the apples.

Jack and Bill are comparing the lengths of their kite tails. Jack sees that the tail of his kite is one half as long as the tail of Bill's kite.

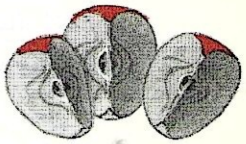
Have you used parts of things, or fractions, in the ways that these boys and girls have?

Equal Parts



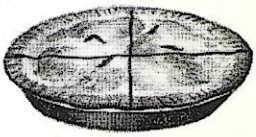
When we divide an orange into 2 equal parts, each part is **one half** of the orange. This is the way we write one half with figures: $\frac{1}{2}$.

How many halves are in the whole orange? We may answer, "Two halves equal one." This is the way we write the answer: $\frac{2}{2} = 1$.



When we divide an apple into 3 equal parts, each part is **one third** of the apple. Two of the parts are two thirds of the whole apple. We write one third like this: $\frac{1}{3}$.

How many thirds are in the whole apple? We may answer, "Three thirds equal one." This is the way we write the answer: $\frac{3}{3} = 1$.

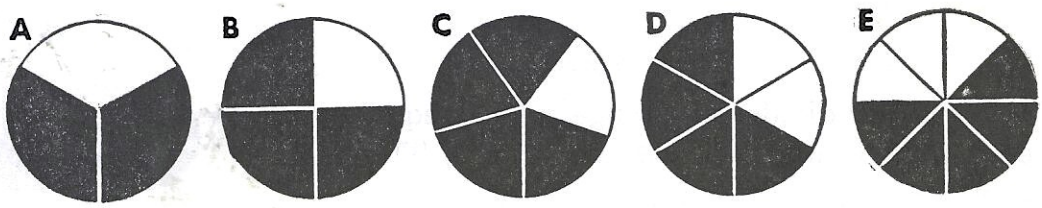


When we divide a pie into 4 equal parts, each part is **one fourth** of the whole pie. We write one fourth like this: $\frac{1}{4}$.

How much are 2 of the equal parts?
How much are 3 of the equal parts?
How much are 4 of the equal parts?
How many fourths are in the whole pie?
This is the way we write the answer: $\frac{4}{4} = 1$.

When we divide a stick of candy into 5 equal parts, each part is **one fifth** ($\frac{1}{5}$) of the whole stick.

How much are 2 of the equal parts?
How much are 3 of the equal parts?
How much are 4 of the equal parts?
How many fifths are in one? Write the answer.



Equal Parts

Circle A is divided into three equal parts. Each part is *one third* of the circle. One third of the circle is white, and *two thirds* of it are black.

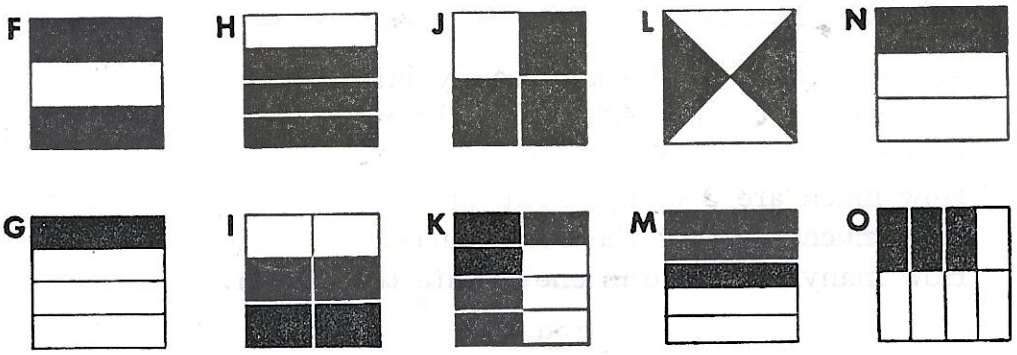
Circle B is divided into four equal parts. Each part is _____ of the circle. One fourth of it is white, and _____ of it are black.

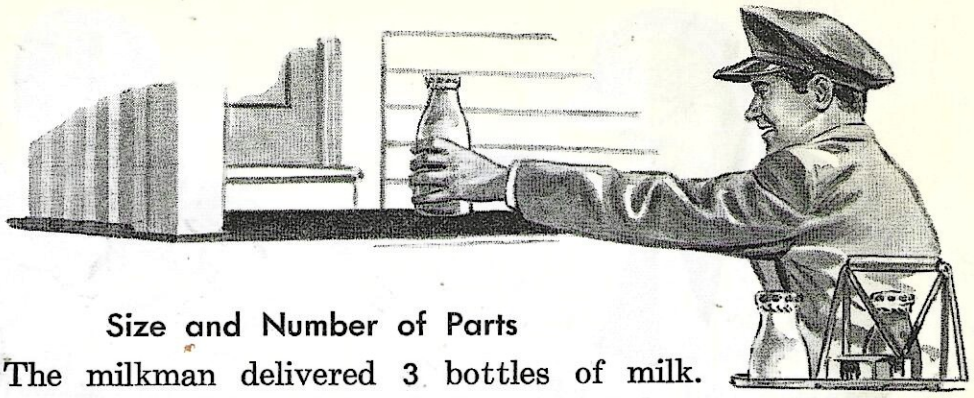
Circle C is divided into five equal parts. Each part is _____ of the circle. One fifth of the circle is white, and _____ of it are black.

Circle D is divided into six equal parts. Each part is _____ of the circle. Two sixths are white, and _____ are black.

Circle E is divided into eight equal parts. Each part is _____ of the circle. Three eighths of it are white, and _____ are black.

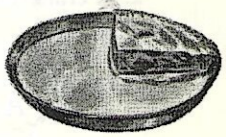
What part of each square is white? What part of each square is black?





Size and Number of Parts

1. The milkman delivered 3 bottles of milk. How much milk did he deliver? Can we tell how much milk (exactly) he delivered? Must we know something about the size of the bottles? Why?



2. Jerry and his family ate 3 of the 4 equal parts of the pie. They ate **three fourths** of it. This is the way we write how much they ate: $\frac{3}{4}$. The figure 3 above the line tells the **number** of parts they ate, and the figure 4 below the line tells the **size** of each part.

3. Jane cut her cake into 8 equal parts. She gave Alice three of the parts, and she kept 5 of the parts for herself.

Each part is **one eighth.** She gave Alice three eighths, and she kept five eighths.

This is the way we write how much she gave Alice: $\frac{3}{8}$. The 3 tells the number of parts (pieces) she gave Alice, and the 8 tells the size of each part.

This is the way we write how much Jane kept for herself: $\frac{5}{8}$. The 5 tells the number of parts, and the 8 tells the size of each part.

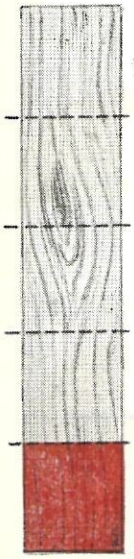
> The figure above the line tells the number of parts.
> The figure below the line tells the size of the parts.

fracture, 1. To break. The carpenter fell from the ladder and fractured his arm. 2. A crack made by breaking.

fraction, 1. One or more of the equal parts of a whole. 2. A part broken off.

Fractions

A long time ago a fraction meant the *broken off* part of anything. The broken off part of a stick was, and still is, a fraction. The equal parts, the fractions, we are now studying were once called *brokens*. Pupils in schools long ago studied brokens. Really they studied parts or fractions.



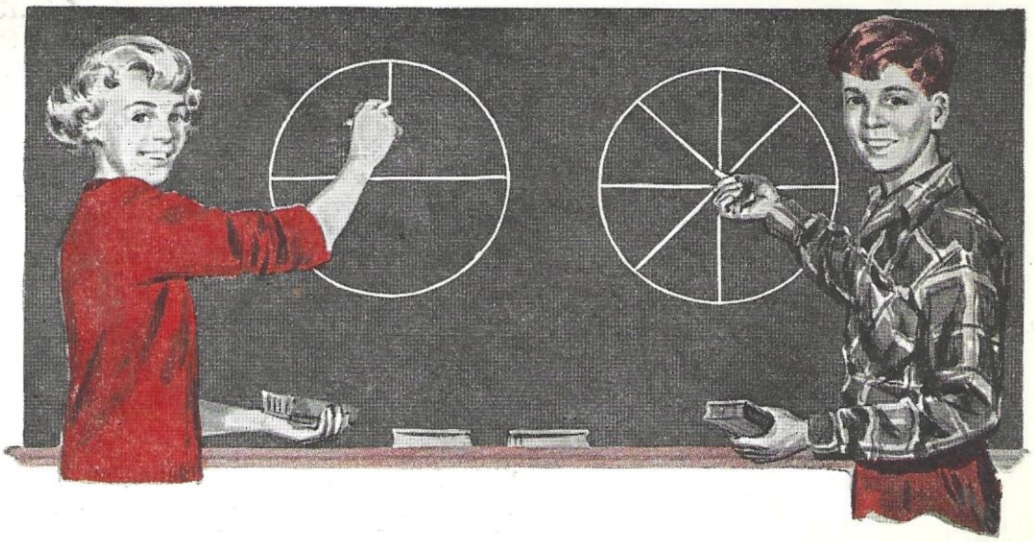
We write a fraction, such as three fifths, like this: $\frac{3}{5}$. The figure below the line tells the size of the parts. It is called the **denominator**. In $\frac{3}{5}$, the 5 means that the size of each part is one fifth of the whole.

The figure above the line tells the number of parts. It is called the **numerator**. In $\frac{3}{5}$, the 3 means that there are 3 equal parts.

The numerator and the denominator are the **terms** of the fraction.

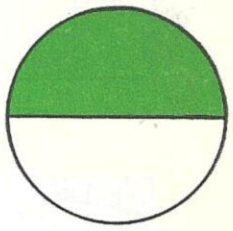
What does the figure 4 tell us? $\frac{4}{5}$ *numerator*

What does the figure 5 tell us? $\frac{4}{5}$ *denominator*

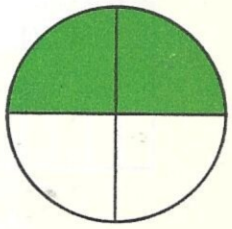


Halves, Fourths, Eighths

Miss West drew a big circle on the board.
Ted divided the circle into 2 equal parts.
He wrote: $\frac{2}{2} = 1$.

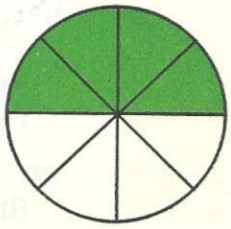


Bess divided the 2 halves. She divided each half into 2 equal parts. She said, "Two halves are four fourths. One half equals two fourths."
She wrote: $\frac{2}{2} = \frac{4}{4}$ and $\frac{1}{2} = \frac{2}{4}$.



Tom divided the 4 fourths. He divided each fourth into 2 equal parts. He said, "Two halves are eight eighths. One half equals four eighths."
He wrote: $\frac{2}{2} = \frac{8}{8}$ and $\frac{1}{2} = \frac{4}{8}$.

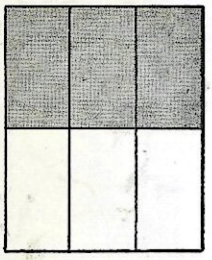
Bess said, "Four fourths are eight eighths; so one fourth equals two eighths.
She wrote: $\frac{4}{4} = \frac{8}{8}$ and $\frac{1}{4} = \frac{2}{8}$.



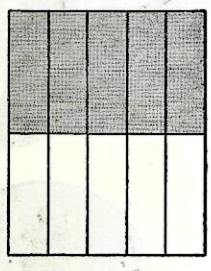
How many eighths are in 2 fourths? $\frac{2}{4} = \frac{?}{8}$

How many eighths are in 3 fourths? $\frac{3}{4} = \frac{?}{8}$

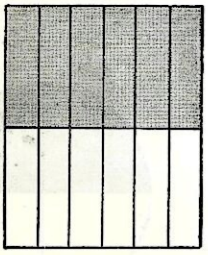
More about Halves



How many sixths are in the whole circle?
How many sixths are in the shaded half?
$1 = \frac{6}{6}$ $\frac{6}{6} = 1$ $\frac{3}{6} = \frac{1}{2}$ $\frac{1}{2} = \frac{3}{6}$
How many eighths are in one?
How many eighths are in one half?
$1 = \frac{8}{8}$ $\frac{8}{8} = 1$ $\frac{4}{8} = \frac{1}{2}$ $\frac{1}{2} = \frac{?}{8}$



How many tenths are in one?
How many tenths are in one half?
$1 = \frac{10}{10}$ $\frac{10}{10} = 1$ $\frac{5}{10} = \frac{1}{2}$ $\frac{1}{2} = \frac{?}{10}$
How many twelfths are in one?
How many twelfths are in one half?
$1 = \frac{12}{12}$ $\frac{12}{12} = 1$ $\frac{6}{12} = \frac{1}{2}$ $\frac{1}{2} = \frac{?}{12}$



Ann said, "I do not need to draw circles to tell about halves. I can reason about halves and tell how many of any smaller-sized parts there are."

"How do you reason about sixteenths?" asked Ted.

"In **one** there are **16 sixteenths**. In **one half** there are just **half as many**, or **8 sixteenths**," answered Ann.

She wrote: $1 = \frac{16}{16}$ and $\frac{1}{2} = \frac{8}{16}$.

Thirds, Sixths, Ninths, Twelfths

When a circle, or anything, is divided into 3 equal parts, what do we call each part?

How many thirds are in one?

$1 = \frac{3}{3}$ $\frac{3}{3} = 1$

How many sixths are in one?

How many sixths are in one third?

$1 = \frac{6}{6}$ $\frac{6}{6} = 1$ $\frac{1}{3} = \frac{2}{6}$ $\frac{2}{6} = \frac{1}{3}$

How many ninths are in one?

How many ninths are in one third?

How many ninths are in two thirds?

$\frac{9}{9} = 1$ $\frac{1}{3} = \frac{3}{9}$ $\frac{2}{3} = \frac{6}{9}$

How many twelfths are in one?

How many twelfths are in one third?

How many twelfths are in two thirds?

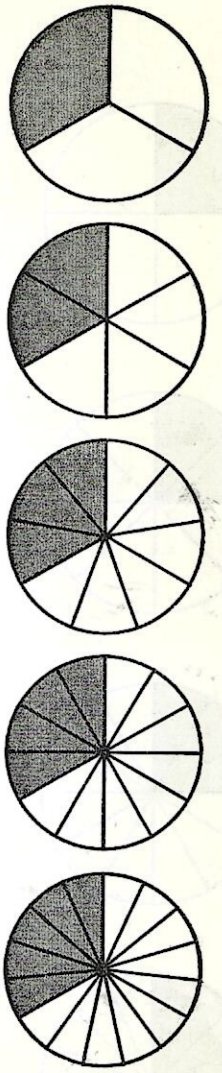
$\frac{12}{12} = 1$ $\frac{1}{3} = \frac{?}{12}$ $\frac{2}{3} = \frac{?}{12}$

"I can reason about thirds as Ann did about halves," said Joe. "In one there are 15 fifteenths. In one third there are just one third as many, or 5 fifteenths."

He wrote: $1 = \frac{15}{15}$ $\frac{1}{3} = \frac{5}{15}$.

"And then I know that in two thirds there are two times 5 fifteenths, or 10 fifteenths," continued Joe.

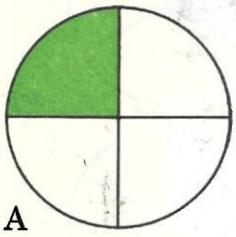
He wrote: $1 = \frac{15}{15}$ $\frac{1}{3} = \frac{5}{15}$ $\frac{2}{3} = \frac{10}{15}$.



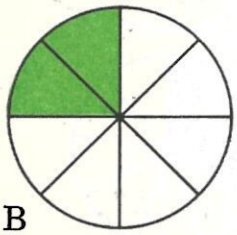
How many eighteenths are in one? $1 = \frac{?}{18}$

How many eighteenths are in one third? $\frac{1}{3} = \frac{?}{18}$

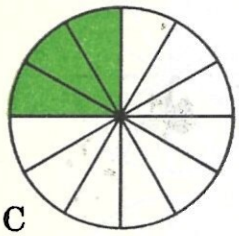
How many eighteenths are in two thirds? $\frac{2}{3} = \frac{?}{18}$



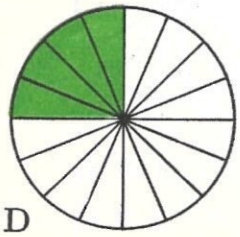
A



B



C



D

Studying Fourths

Circle A is divided into 4 equal parts.
Each part is one fourth ($\frac{1}{4}$) of the circle.
Two parts are $\frac{2}{4}$, or $\frac{1}{2}$, of the circle.
Three parts are $\frac{3}{4}$ of the circle.

Let us count the eighths, the twelfths, and the sixteenths in each fourth of a circle.

Circle B shows $\frac{8}{8} = 1$.
How many eighths are in $\frac{1}{4}$?
How many eighths are in $\frac{2}{4}$? in $\frac{1}{2}$?
How many eighths are in $\frac{3}{4}$?

$\frac{1}{4} = \frac{?}{8}$ $\frac{2}{4} = \frac{?}{8}$ $\frac{3}{4} = \frac{?}{8}$ $\frac{1}{2} = \frac{?}{8}$

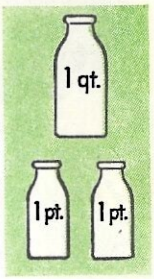
Circle C shows $\frac{12}{12} = 1$.
How many twelfths are in $\frac{1}{4}$?
How many twelfths are in $\frac{2}{4}$? in $\frac{1}{2}$?
How many twelfths are in $\frac{3}{4}$?

$\frac{1}{4} = \frac{?}{12}$ $\frac{2}{4} = \frac{?}{12}$ $\frac{3}{4} = \frac{?}{12}$ $\frac{1}{2} = \frac{?}{12}$

Circle D shows $\frac{16}{16} = 1$.
How many sixteenths are in $\frac{1}{4}$?
How many sixteenths are in $\frac{2}{4}$? in $\frac{1}{2}$?
How many sixteenths are in $\frac{3}{4}$?

$\frac{1}{4} = \frac{?}{16}$ $\frac{2}{4} = \frac{?}{16}$ $\frac{3}{4} = \frac{?}{16}$ $\frac{1}{2} = \frac{?}{16}$

Fractions in Measures



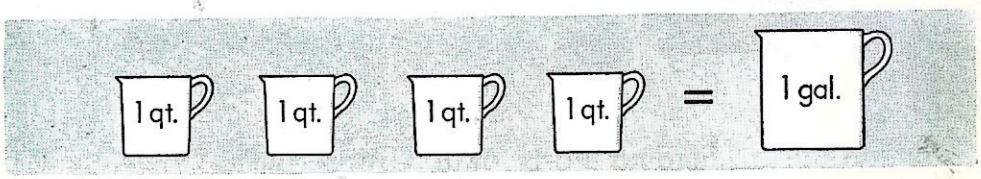
1. What part of a gallon is one quart?

2. Two quarts are how many fourths of a gallon? One half gallon is how many fourths?

1 quart = $\frac{1}{4}$ gallon 2 quarts = $\frac{1}{2}$ gallon

3. How many pints are one quart? Is one pint half of one quart?

1 pint = $\frac{1}{2}$ quart

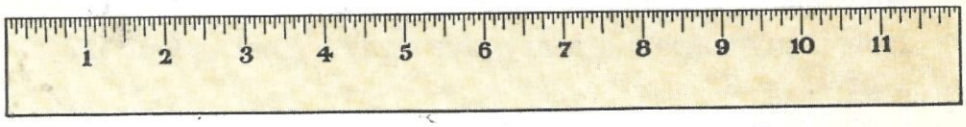


4. Each inch is what part of one foot?

5. How many inches (twelfths) are there in $\frac{1}{2}$ foot?

6. How many inches (twelfths) are there in $\frac{1}{3}$ foot?

7. $\frac{1}{2} = \frac{?}{12}$ $\frac{1}{3} = \frac{?}{12}$ $\frac{1}{4} = \frac{?}{12}$



8. Study the picture of the ruler, and tell which is the largest and which is the smallest fraction: $\frac{1}{2}$, $\frac{1}{3}$, or $\frac{1}{4}$.

9. How many dimes are in one dollar?

10. One dime is what part of one dollar?

11. How many dimes (tenths) are there in $\frac{1}{2}$ dollar?

12. How many dimes (tenths) are there in $\frac{1}{5}$ dollar?

13. Tell which is the larger and which is the smaller part of a dollar: $\frac{1}{2}$ or $\frac{1}{5}$.

Finding Parts of a Group

1. Aunt Helen sent Mary 12 beautiful pine cones from California. Mary shared the cones equally with three of her best friends. What fractional part of the cones did Mary give to each of her friends? What fractional part of the cones did she keep for herself?

How many cones did Mary keep? What is $\frac{1}{4}$ of 12?

How many cones did Mary give away? What is $\frac{3}{4}$ of 12?

$\frac{1}{4}$ of 12 = 3.

$\frac{3}{4}$ of 12 is 3 times as many as $\frac{1}{4}$.

So $\frac{3}{4}$ of 12 is 3 × 3, or 9.

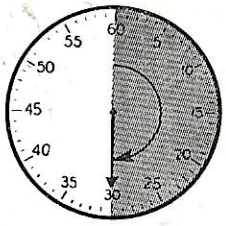
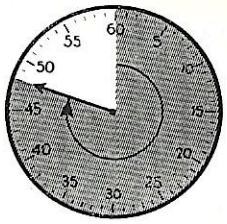
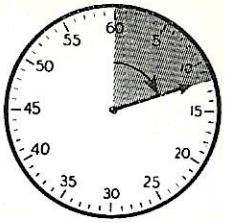
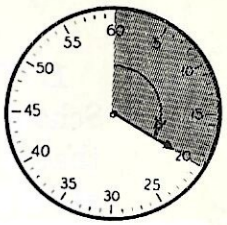
Mary kept 3 cones, and she gave away 9 cones.

2. How many cones are $\frac{1}{3}$ of 12 cones? Then $\frac{2}{3}$ of 12 cones are how many times as many as $\frac{1}{3}$ of 12 cones?

What is $\frac{1}{3}$ of 12? $\frac{2}{3}$ of 12 = 2 × 4, or 8.

3. There are 16 ounces in a pound. How many ounces are $\frac{1}{8}$ of a pound? $\frac{3}{8}$ of a pound? $\frac{5}{8}$ of a pound?

4. How many inches are $\frac{2}{3}$ of a foot? $\frac{3}{4}$ of a foot?

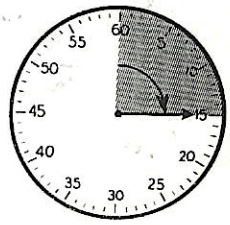
Parts of an Hour

It takes 60 minutes, or 1 hour, for the minute hand to go around the face of the clock. There are 60 minutes in 1 hour.

How many minutes are in $\frac{1}{2}$ hour?

$\frac{1}{2}$ of 60 minutes = 30 minutes. $2\overline{)60}$ minutes

There are 30 minutes in $\frac{1}{2}$ hour. $\frac{1}{2}$ hr. = 30 min.



How many minutes are in $\frac{4}{5}$ of an hour?

In $\frac{1}{5}$ of an hour there are $\frac{1}{5}$ of 60 minutes, or 12 minutes. Then in $\frac{4}{5}$ of an hour there are 4 × 12 minutes, or 48 minutes.

$\frac{4}{5}$ hr. = 48 min.

Remember that there are 60 minutes in 1 hour. Answer these questions about parts of an hour:

1. $\frac{1}{3}$ of an hour = _____ minutes.
2. $\frac{1}{4}$ of an hour = _____ minutes.
3. $\frac{1}{5}$ of an hour = _____ minutes.
4. $\frac{1}{6}$ of an hour = _____ minutes.
5. $\frac{1}{10}$ of an hour = _____ minutes.
6. $\frac{1}{15}$ of an hour = _____ minutes.
7. $\frac{1}{20}$ of an hour = _____ minutes.
8. $\frac{1}{30}$ of an hour = _____ minutes.
9. $\frac{2}{3}$ of an hour = _____ minutes.
10. $\frac{3}{4}$ of an hour = _____ minutes.
11. $\frac{2}{5}$ of an hour = _____ minutes.
12. $\frac{3}{5}$ of an hour = _____ minutes.
13. $\frac{5}{6}$ of an hour = _____ minutes.
14. $\frac{3}{10}$ of an hour = _____ minutes.
15. $\frac{7}{10}$ of an hour = _____ minutes.
16. $\frac{8}{10}$ of an hour = _____ minutes.

Finding Parts

1. There are 576 pupils enrolled in the Eastmont School. About $\frac{3}{4}$ of the pupils attended the band concert that was given in the city park. About how many pupils attended the band concert?

$$\begin{array}{r} 144 \\ 4\overline{)576} \\ \underline{4} \\ 17 \\ \underline{16} \\ 16 \\ \underline{16} \end{array} \qquad \begin{array}{r} 144 \\ \times\ 3 \\ \hline 432 \end{array}$$

To find $\frac{1}{4}$ of 576, we divide 576 by 4. $\frac{1}{4}$ of 576 = 144.

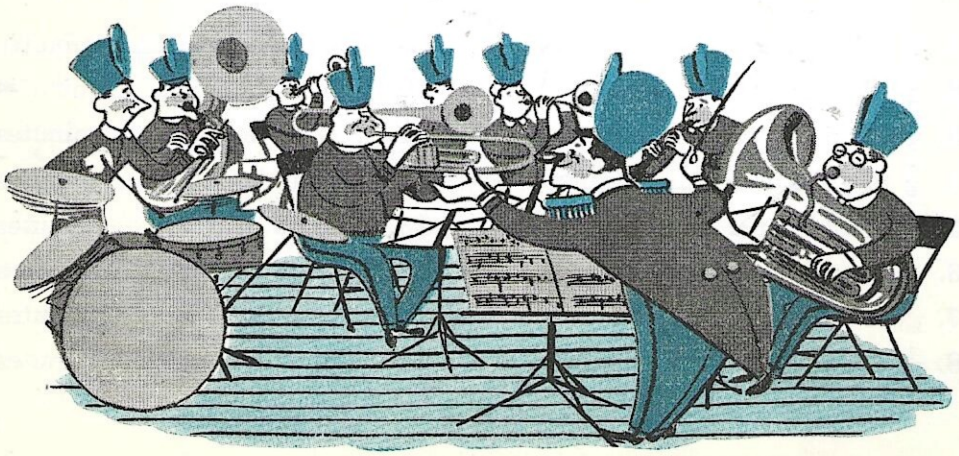
To find $\frac{3}{4}$ of 576, we multiply 144 by 3. The answer is 432.

About 432 pupils attended the band concert.

2. The paper said that there were about 1200 people at the band concert and that $\frac{2}{3}$ of those there were school children. How many school children were there?

Find:

	(*a*)	(*b*)	(*c*)	(*d*)	(*e*)
3.	$\frac{2}{3}$ of 27	$\frac{5}{6}$ of 48	$\frac{3}{5}$ of 35	$\frac{3}{4}$ of 32	$\frac{2}{7}$ of 63
4.	$\frac{5}{8}$ of 64	$\frac{4}{9}$ of 72	$\frac{2}{5}$ of 40	$\frac{3}{8}$ of 56	$\frac{3}{7}$ of 49
5.	$\frac{5}{9}$ of 81	$\frac{2}{3}$ of 81	$\frac{3}{5}$ of 265	$\frac{5}{8}$ of 336	$\frac{3}{4}$ of 256



Finding Parts

1. During the summer months James Watson made \$52.00 working in a store. James saved $\frac{3}{4}$ of what he made. How much did he save?

2. James and his friends built a log hut at their fathers' fishing camp. The hut cost \$44.70 to build. James's share of the expense was $\frac{1}{6}$. How much was James's share?

3. James withdrew \$7.45 from his savings to pay his share on the hut. How much did he have left in the savings?

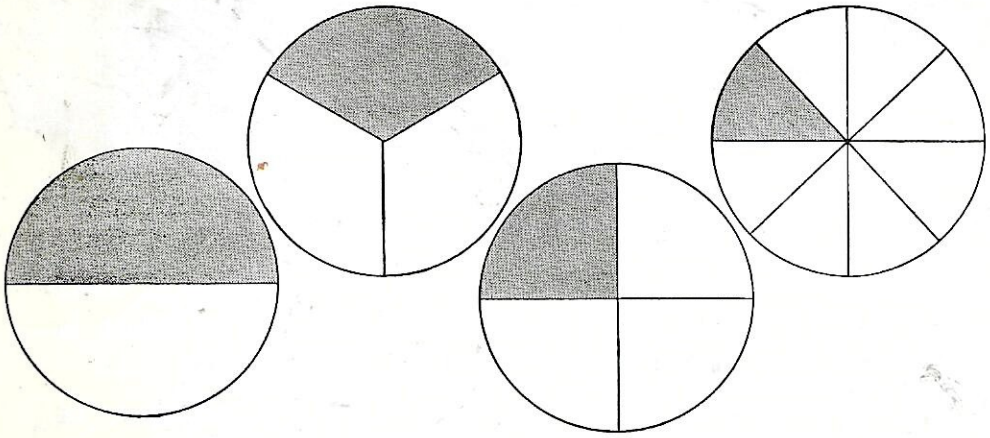
One fact is missing: How much did he have in the savings? We can find this fact. It is the answer to problem **1**.

4. Tom had \$27.60 in the school savings bank. He drew out $\frac{1}{3}$ of it to pay his share on the hut and to buy his camping equipment. How much did he have left for camping equipment after he paid \$7.45 as his share on the hut?

Find:

	(*a*)	(*b*)	(*c*)	(*d*)
5.	$\frac{1}{6}$ of \$8.40	$\frac{1}{2}$ of \$31.70	$\frac{1}{5}$ of \$17.65	$\frac{1}{3}$ of \$16.80
6.	$\frac{3}{8}$ of \$7.84	$\frac{3}{5}$ of \$12.00	$\frac{3}{4}$ of \$5.36	$\frac{2}{3}$ of \$11.25

Chapter 8
Comparing Parts



Number and Size of Parts

"How big is a fraction?" asked Walter.

"It depends on the size of each part," answered Nan.

"And it depends on the number of parts, too," said Jane.

1. Draw 3 circles on your paper. Be sure they are the same size. Divide one circle into halves, one into thirds, and one into fourths.

Look at the circles. Which is the largest, $\frac{1}{4}$, $\frac{1}{2}$, or $\frac{1}{3}$?

2. Draw another circle and divide it into eighths.

Which of the following is the largest fraction?

$\frac{5}{8}$ $\frac{3}{8}$ $\frac{7}{8}$ $\frac{4}{8}$ $\frac{1}{8}$ $\frac{6}{8}$ $\frac{2}{8}$

3. What does each fraction below mean? What figure tells the number of parts? What figure tells the size of the part?

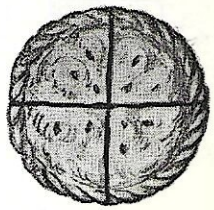
$\frac{2}{3}$ $\frac{3}{4}$ $\frac{5}{6}$ $\frac{3}{5}$ $\frac{1}{8}$ $\frac{3}{8}$ $\frac{7}{12}$ $\frac{7}{8}$ $\frac{5}{16}$ $\frac{3}{5}$

Size of Parts

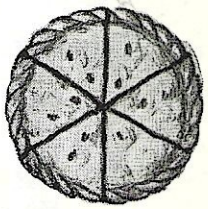
"I have worked a third of my examples," said Jim.

"I have half of mine worked," said Jane.

The figure 3 in $\frac{1}{3}$ shows the size of the part Jim has done. In the denominator the 3 is not called three, but **third**, because it stands for, or tells, size. The 2 in $\frac{1}{2}$ does not tell two, but **half**. The denominator tells **size**.

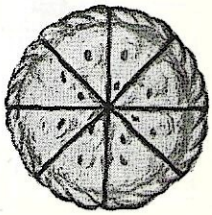


Mother is cutting a piece of fresh berry pie for Jim. Jim is thinking about the size of the piece of pie he would like to have. Do you think Jim is interested in fractions, at least, fractions of the pie?



Which is the biggest, the $\frac{1}{4}$ piece, the $\frac{1}{6}$ piece, or the $\frac{1}{8}$ piece?

Jane has broken her stick of candy into parts. There are 4 little pieces and 2 big pieces. She offers to share it with Jim.

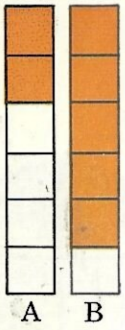


"Which will you take, four pieces or two pieces?" asked Jane.

"I'll take the four pieces," answered Jim. "NO! WAIT! Maybe there is a catch to it. Size counts, you know."

To compare fractions, we must pay attention to both the number of parts and the sizes of the parts.

Comparing Parts of the Same Size



Two strips of paper that are the same length are divided into sixths.

How many sixths of strip A are shaded?

How many sixths of strip B are shaded?

Now let us compare $\frac{2}{6}$ and $\frac{5}{6}$.

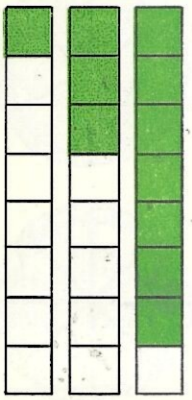
Which is more, $\frac{2}{6}$ or $\frac{5}{6}$?

How much more is $\frac{5}{6}$ than $\frac{2}{6}$?

5 sixths is 3 sixths more than 2 sixths.

$\frac{5}{6}$ is $\frac{3}{6}$ more than $\frac{2}{6}$.

When the parts are the same size, the fraction with more parts is the larger fraction. When fractions have the same denominator, the fraction with the largest numerator is the largest fraction.



Which is the largest of anything, $\frac{1}{8}$, $\frac{3}{8}$, or $\frac{7}{8}$?

How much larger is $\frac{7}{8}$ than $\frac{3}{8}$?

7 eighths is 4 eighths larger than 3 eighths.

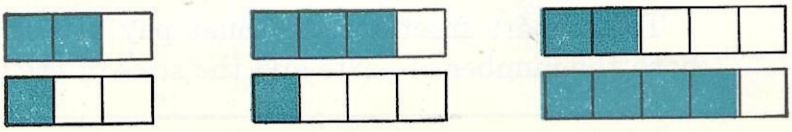
$\frac{7}{8}$ is $\frac{4}{8}$ larger than $\frac{3}{8}$.

When the parts are the same size, we compare the number of parts to find how much larger one fraction is than the other. When fractions have the same denominator, we compare the numerators to find how much larger one is than the other.

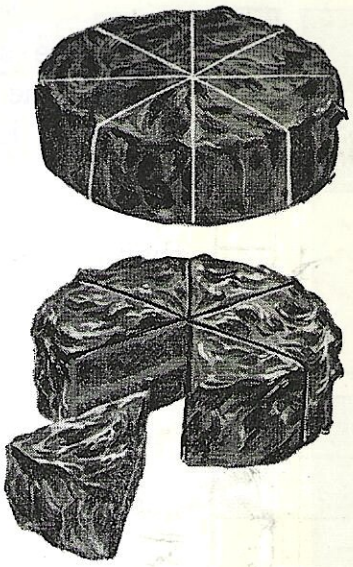
How much larger is $\frac{2}{3}$ than $\frac{1}{3}$?

How much larger is $\frac{3}{4}$ than $\frac{1}{4}$?

How much smaller is $\frac{2}{5}$ than $\frac{4}{5}$?



Comparing Sizes of Parts



1. Jane baked 2 cakes the same size. She cut one cake into 8 equal pieces. What is the size of each piece?

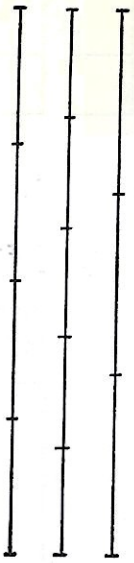
She cut the other cake into 6 equal pieces. What is the size of each piece of this cake?

Which piece of cake is larger, the $\frac{1}{8}$ or the $\frac{1}{6}$?

The parts are not the same size. The piece which is one eighth in size is smaller than the piece which is one sixth in size. One sixth is larger than one eighth, or one eighth is smaller than one sixth.

$\frac{1}{6}$ is larger than $\frac{1}{8}$. $\frac{1}{8}$ is smaller than $\frac{1}{6}$.

The fraction with the smaller denominator has the larger-sized parts, and the fraction with the larger denominator has the smaller-sized parts.



To compare fractions whose numerator is 1, we look at the denominators. The fraction with the largest denominator is the smallest fraction, and the fraction with the smallest denominator is the largest fraction.

2. Which is the larger, $\frac{1}{4}$ or $\frac{1}{5}$? $\frac{1}{2}$ or $\frac{1}{3}$? $\frac{1}{3}$ or $\frac{1}{4}$?

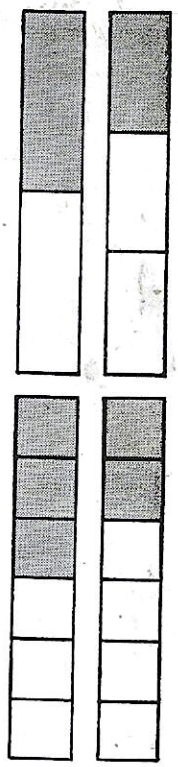
3. Read the largest fraction in each group below:

$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$ $\quad$ $\frac{1}{5}$ $\frac{1}{3}$ $\frac{1}{4}$ $\quad$ $\frac{1}{2}$ $\frac{1}{6}$ $\frac{1}{3}$ $\quad$ $\frac{1}{3}$ $\frac{1}{6}$ $\frac{1}{4}$ $\frac{1}{12}$

4. Read the smallest fraction in each group above.

5. Would you rather have $\frac{1}{2}$ of a dollar or $\frac{1}{4}$ of a dollar?

6. Which would you rather have, $\frac{1}{2}$ pint or $\frac{1}{4}$ pint of ice cream?



Comparing Parts of Different Sizes

1. Here are two strips of paper that are the same length. One strip is divided into halves, and the other is divided into thirds.

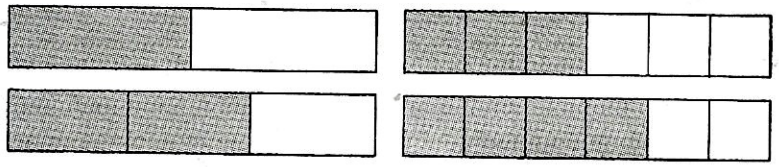
Which is larger, the $\frac{1}{2}$ or the $\frac{1}{3}$?

We can see that $\frac{1}{2}$ is larger than $\frac{1}{3}$, or that $\frac{1}{3}$ is smaller than $\frac{1}{2}$. But we cannot tell exactly how much larger $\frac{1}{2}$ is than $\frac{1}{3}$.

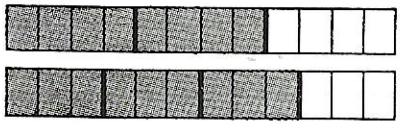
Let us divide each strip into sixths and put the strips on each other. How much larger is $\frac{1}{2}$ than $\frac{1}{3}$?

We can see that $\frac{1}{2}$ is one sixth larger than $\frac{1}{3}$.

2. Use the strips of paper below to answer these questions: Which is larger, $\frac{1}{2}$ or $\frac{2}{3}$? How much larger is $\frac{2}{3}$ than $\frac{1}{2}$?



3. Here are two strips of paper. One of the strips is divided into fourths, and the other is divided into thirds.



Which is larger, $\frac{2}{3}$ or $\frac{3}{4}$?
How much larger is $\frac{3}{4}$ than $\frac{2}{3}$?
How much smaller is $\frac{2}{3}$ than $\frac{3}{4}$?

To compare two fractions:

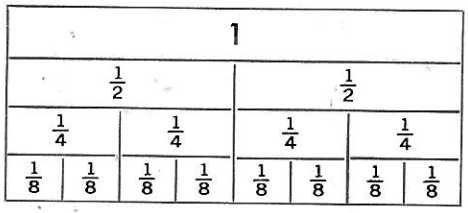
1. Pay attention to number and size.
2. Change parts of different sizes into parts of the same size.

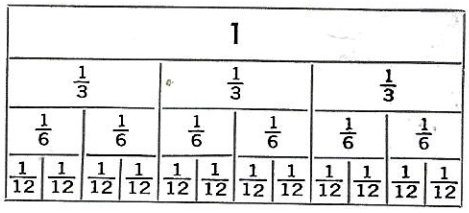
Changing to Parts of the Same Size

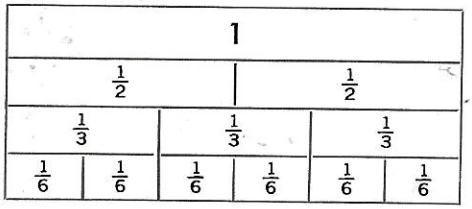
"We can use the charts to compare parts," said Miss Wilson. "Suppose we want to compare one half and one third. We cannot compare halves and thirds exactly as halves and thirds. We have to change them to parts of the same size. We can see from the chart that one half equals three sixths and that one third equals two sixths. Which is larger, 3 sixths or 2 sixths? How much larger is 3 sixths than 2 sixths? How much larger is one half than one third?"

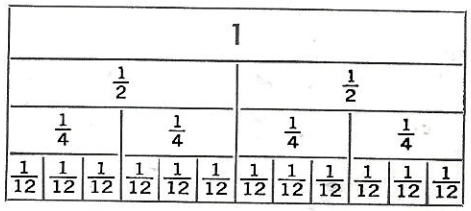
$\frac{1}{2} = \frac{3}{6}$ $\frac{1}{3} = \frac{2}{6}$ $\frac{3}{6}$ is $\frac{1}{6}$ larger than $\frac{2}{6}$.

So $\frac{1}{2}$ is $\frac{1}{6}$ larger than $\frac{1}{3}$.









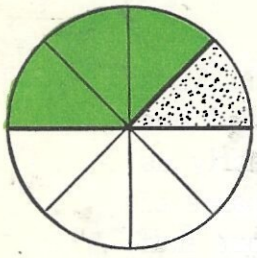
1. Use the charts to help you answer these questions:

$\frac{1}{2} = \frac{?}{4}$ $\frac{1}{2} = \frac{?}{8}$ $\frac{1}{2} = \frac{?}{12}$ $\frac{1}{3} = \frac{?}{6}$ $\frac{2}{3} = \frac{?}{6}$ $\frac{1}{3} = \frac{?}{12}$

$\frac{1}{4} = \frac{?}{8}$ $\frac{1}{4} = \frac{?}{12}$ $\frac{3}{4} = \frac{?}{12}$ $\frac{2}{3} = \frac{?}{12}$ $\frac{1}{6} = \frac{?}{12}$ $\frac{5}{6} = \frac{?}{12}$

2. How much larger is $\frac{5}{6}$ than $\frac{2}{3}$?

3. How much larger is $\frac{7}{12}$ than $\frac{1}{2}$?



Changing to Parts of the Same Size

"I know that $\frac{1}{2}$ is more than $\frac{3}{8}$. I know that $\frac{1}{2} = \frac{4}{8}$. I compare $\frac{4}{8}$ and $\frac{3}{8}$ and find that $\frac{4}{8}$ is $\frac{1}{8}$ larger than $\frac{3}{8}$. So $\frac{1}{2}$ is $\frac{1}{8}$ larger than $\frac{3}{8}$. I can tell this from the chart or by drawing circles. How can I tell without the use of circles?" asked Carl.

"When we want to compare fractions that have different-sized parts, we must first change them to parts of the same size. When we compare $\frac{1}{2}$ and $\frac{1}{3}$, we change them to sixths: $\frac{1}{2} = \frac{3}{6}$, and $\frac{1}{3} = \frac{2}{6}$. Then we compare $\frac{3}{6}$ and $\frac{2}{6}$, and we know that $\frac{1}{2}$ is $\frac{1}{6}$ more than $\frac{1}{3}$," explained Miss Wilson.

Miss Wilson continued, "We do not have to use the circles or charts to change parts to the same size.

"To change $\frac{1}{3}$ to sixths, we must think that there are 6 sixths in 1. In $\frac{1}{3}$ there are $\frac{1}{3}$ of 6 sixths, or 2 sixths. To change $\frac{1}{2}$ to sixths, we must think that there are 6 sixths in 1. Then in $\frac{1}{2}$ there are $\frac{1}{2}$ of 6 sixths, or 3 sixths. Now all the parts are sixths. We can compare them."

$\frac{3}{4} = \frac{?}{16}$

The example asks, "How many sixteenths are in three fourths?" This is the way we think the answer: In 1 there are 16 sixteenths.

In $\frac{1}{4}$ there are $\frac{1}{4}$ of 16 sixteenths, or 4 sixteenths.
In $\frac{3}{4}$ there are 3×4 sixteenths, or 12 sixteenths.
So $\frac{3}{4} = \frac{12}{16}$.

Change $\frac{1}{3}$ and $\frac{3}{4}$ to twelfths, and then compare them.

Change $\frac{5}{6}$ and $\frac{3}{4}$ to twelfths, and then compare them.

Finding the Common Denominator

"Before we can compare two fractions, we must change them to parts of the same size. I understand that," said Susan. "But how can we tell which sized parts to change them to?"

"Denominators show size. If two fractions have different denominators, their parts are of different sizes. To compare two fractions with different denominators, we much first change them to parts of the same size. That is, we must change them so they will have the same denominator. We call it the **common denominator.**

"Suppose we want to compare $\frac{1}{2}$ and $\frac{1}{8}$. Look at the smaller part, the eighth. Can we divide a half into eighths? We know that we can change one half to eighths. Eighths are the sized parts that we use," explained Miss Wilson.

"Look at the larger denominator, 8. Can it be divided by the other denominator? Can we divide 8 by 2? Then 8 is the common denominator."

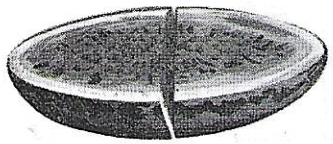
$\frac{1}{2} = \frac{4}{8}$ $\frac{4}{8}$ is $\frac{3}{8}$ more than $\frac{1}{8}$.

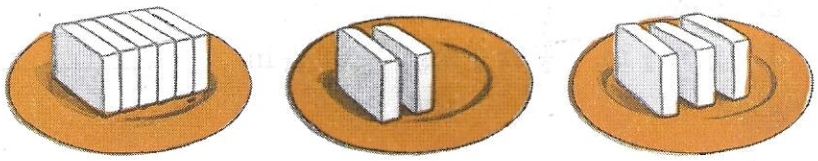
Compare: $\frac{1}{2}$ and $\frac{1}{12}$ $\frac{1}{2}$ and $\frac{5}{12}$ $\frac{1}{3}$ and $\frac{5}{12}$ $\frac{1}{4}$ and $\frac{3}{8}$

$\frac{1}{4}$ and $\frac{1}{12}$ $\frac{2}{3}$ and $\frac{5}{6}$ $\frac{3}{4}$ and $\frac{5}{16}$ $\frac{1}{2}$ and $\frac{3}{6}$

1. Jack ate $\frac{1}{4}$ of the watermelon, and his father ate $\frac{1}{2}$ of it. Who ate more and how much more?

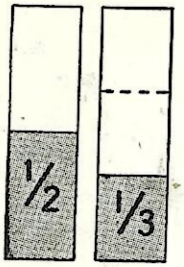
2. Jane divided the brick of ice cream into 6 equal parts. She ate $\frac{1}{3}$ of it, and Tom ate $\frac{1}{2}$ of it. Who ate more and how much more?



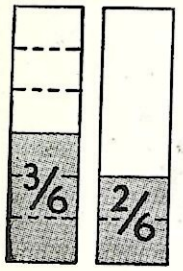


Finding the Common Denominator

Suppose we want to compare $\frac{1}{2}$ and $\frac{1}{3}$ of something. The denominators are different; so we must find the common denominator. First, we see if either denominator is the common denominator. Can we divide 3 by 2? Next, we multiply 3 by 2. Can we divide 6 by 2? Can we divide 6 by 3? Then 6 is the common denominator.



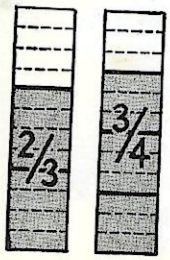
$\frac{1}{2} = \frac{3}{6}$ $\frac{1}{3} = \frac{2}{6}$ $\frac{3}{6}$ is $\frac{1}{6}$ more than $\frac{2}{6}$. $\frac{1}{2}$ is $\frac{1}{6}$ more than $\frac{1}{3}$.



To compare two fractions with different denominators, change them to fractions having a common denominator.

To find the common denominator:

1. See if one denominator is the common denominator. Can we divide one denominator by the other?
2. If neither denominator is the common denominator, we multiply the larger denominator by 2, 3, 4, and so on until we get a product that can be divided evenly by the smaller denominator.

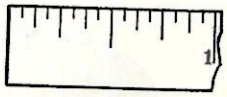


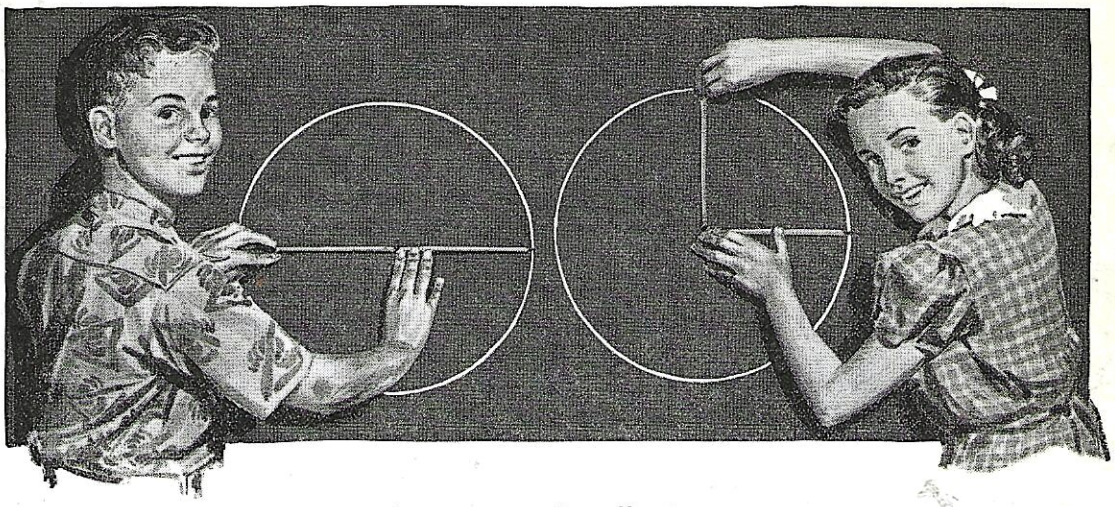
1. Which is larger, $\frac{3}{4}$ or $\frac{2}{3}$?

We know that 4 is not the common denominator. Why? $2 \times 4 = 8$, but 8 is not the common denominator either. $3 \times 4 = 12$. Why is 12 the common denominator?

Which is larger and how much larger?

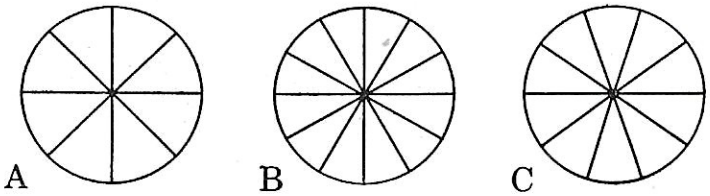
	(*a*)	(*b*)	(*c*)
2.	$\frac{1}{4}$ or $\frac{3}{8}$ in.	$\frac{3}{8}$ or $\frac{5}{16}$ in.	$\frac{7}{8}$ or $\frac{15}{16}$ in.
3.	$\frac{3}{4}$ or $\frac{7}{8}$ in.	$\frac{1}{2}$ or $\frac{5}{8}$ in.	$\frac{1}{2}$ or $\frac{7}{16}$ in.





Larger or Smaller?

Jack is using his pencils to show one half. How is Jane using her pencils to show one fourth?

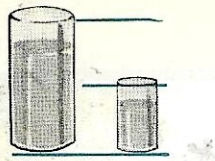


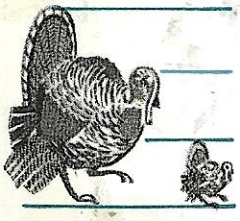
1. Use cards to frame:

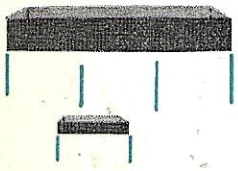
In Circle A	In Circle B	In Circle C
a. $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$	*a.* $\frac{1}{3}$, $\frac{1}{6}$, $\frac{1}{12}$	*a.* $\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{10}$
b. $\frac{3}{4}$, $\frac{5}{8}$, $\frac{7}{8}$	*b.* $\frac{1}{2}$, $\frac{1}{4}$, $\frac{2}{3}$	*b.* $\frac{2}{5}$, $\frac{3}{5}$, $\frac{3}{10}$

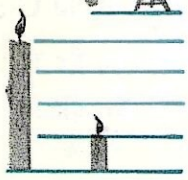
Which is larger and how much larger?

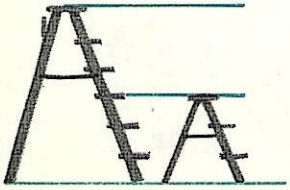
In Circle A	In Circle B	In Circle C
2. $\frac{1}{2}$ or $\frac{3}{4}$	$\frac{2}{3}$ or $\frac{7}{12}$	$\frac{1}{2}$ or $\frac{6}{10}$
3. $\frac{1}{2}$ or $\frac{5}{8}$	$\frac{1}{3}$ or $\frac{1}{2}$	$\frac{2}{5}$ or $\frac{1}{2}$
4. $\frac{3}{4}$ or $\frac{7}{8}$	$\frac{3}{4}$ or $\frac{5}{6}$	$\frac{3}{5}$ or $\frac{7}{10}$











Using Fractions to Compare Sizes

1. The small glass is half as tall as the large glass, and the large glass is twice as tall as the small glass.

2. The big turkey is three times as tall as the little turkey. So the little turkey is *one third* as tall as the big turkey.

3. The length of the little candy bar is what part of the length of the larger candy bar?

The larger candy bar is _____ times as long as the little bar, and the little bar is _____ _____ as long as the larger bar.

4. Compare the lengths of the two boxes.

The long box is ____ times as long as the short box, and the short box is _____ _____ as long as the long box.

5. The taller glass shows 3 equal divisions. It is marked into thirds. The shorter glass is as tall as two of the parts. So it is $\frac{2}{3}$ as tall as the taller glass.

6. How do the stools compare in height?

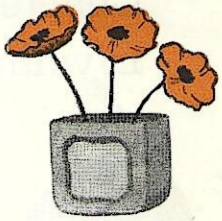
7. Look at the other pictures. Then read the sentences, saying the right word in each blank:

a. The shorter candle is ____ _____ as tall as the longer candle.

b. One step ladder is ____ _____ as tall as the other.

c. The shorter pencil is ____ _____ as long as the longer pencil.

Using Fractions to Compare Groups

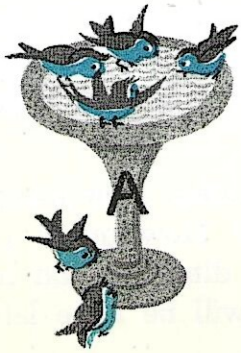


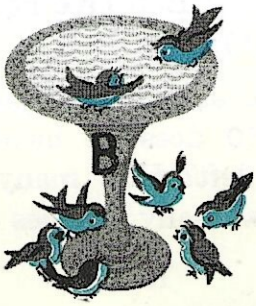
1. Let us compare the number of flowers in the two vases. There are 3 flowers in one vase and 6 flowers in the other vase. There are two 3's in 6. So there are two times as many flowers in one vase as there are in the other. Or there are half as many flowers in one vase as there are in the other.

2. There are 2 oranges on one plate and 6 oranges on the other plate. There are three times as many oranges on one plate as there are on the other. Or there are one third as many oranges on one plate as there are on the other plate.

3. Compare the number of things in each picture below. Find what part the smaller group is of the larger group. Then the larger group is how many times as large as the smaller group?

In picture A, there are **half** as many birds on the ground as there are in the birdbath. There are **twice** as many birds in the birdbath as there are on the ground.





TO BE CONTINUED

216
thirty-three
49
4
14
thousand
382
twenty
96
34
WHEAT · KAUFFMAN · DOUGLASS
406
5
thirty
21
eighty
8
two hundred
84
210
nine
9
45
four thousand
96
3
fifteen